ENVIRONMENTAL ASSESSMENT

for

NELLIS AIR FORCE RANGE COMPLEX FIBER OPTIC LINE ROUTE

from

INDIAN SPRINGS AFAF,
CLARK COUNTY, NEVADA

to

CEDAR PASS FACILITY, NAFR NORTH RANGE
NYE COUNTY, NEVADA

January 1998

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FINDING OF NO SIGNIFICANT IMPACT

1.0 Name of the Action

Fiber Optic Line Installation from Indian Springs to Cedar Pass

2.0 Description of the Proposed Action and Alternatives

The U.S. Air Force proposes to install a Fiber Optic Line (FOL) on the Nellis Air Force Range from Indian Springs Air Force Auxiliary Field (ISAFAF) to the Cedar Pass Facility. The FOL transmits data generated by Air Force training, testing and evaluation programs related to air- and ground-based systems. A FOL network already exists from Nellis Air Force Base to Indian Springs and at the Northern Range Complex.

Alternatives to the proposed action include "No Action", "Alternative Data Transmission Technologies", and "Alternative Routing of the FOL". The "No Action" alternative would not install a FOL. This alternative would not meet mission needs. The "Alternative Data Transmission Technologies" includes the use of radio or microwave technology. This alternative would require a large radio frequency bandwidth which would not be practical. The "Alternative Routing of the FOL" would install an above ground FOL from ISAFAF to Tolicha Peak along the U.S. Highway 95 right-of-way. This alternative would increase costs and decrease system reliability by exposing the FOL to the elements and possible vandalism.

3.0 Summary of Environmental Impact

3.1 The proposed action would allow for a temporary expansion of the area occupied by flammable, exotic, annual plant species. This effect would only be temporary since most of the FOL alignment would be on established roads. Traffic on the roads would preclude the long-term intrusion of these plants. The portions of the route that are not on roads are within utility corridors (power-lines). Weeds can grow in these areas, but would supplant the weeds in these already disturbed areas.

3.2 A temporary reduction in available forage for wild horses and wildlife could occur due to the proposed action. The entire FOL route would be placed in existing disturbed areas and roads where there is not a lot of vegetation. The installation would remove some vegetation through the less used utility rights-of-way, but since the width of the trench is only 0.6 m the impact would be minimal.

3.3 The proposed action would cause a temporary increase in degradation of visual resources. The FOL corridor will be within disturbed roads and utility corridors. The dominant features of the road and power-lines make the trench almost unnoticeable.

3.4 The proposed action would have short-term negative impacts to air emissions. Air quality impacts would occur from Particulate Matter 10 (PM_{10}) emissions caused during the placement of the FOL.

4.0 Conclusion

The proposed action does not represent a major federal action with significant impacts to the human or natural environment, therefore an Environmental Impact Statement is not required. A Finding of No Significant Impact is thus warranted.

David L. Oles

DAVID L. OLES
Colonel, USAF
Vice Commander

27 March 1998
Date

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EXECUTIVE SUMMARY

PURPOSE OF THE PROPOSED ACTION

The US Air Force (USAF) proposes to establish a fiber optic line (FOL) route on the Nellis Air Force Range (NAFR) complex to transmit data generated by Air Force training, testing and evaluation programs related to air- and ground-based systems. The proposed action would provide a route for FOL communication between the Indian Springs Air Force Auxiliary Field (AFAF) and the Cedar Pass Facility in Cactus Flat, on the NAFR North Range. A FOL network is currently in place from Nellis AFB to Indian Springs AFAF, and on the NAFR North Range.

ALTERNATIVE ACTIONS

Four actions, including the proposed action, have been considered for this project. The alternatives are: "No Action", "Alternative Data Transmission Technologies", and "Alternate Routing".

ANTICIPATED ENVIRONMENTAL IMPACTS

The proposed FOL route would be superimposed on top of existing disturbances, or located immediately adjacent to existing roads and utility corridors. The complete affiliation with existing disturbances eliminates adverse effects to historical/cultural resources in the area.

There are no effects anticipated either on water quality/quantity, or on the regional socioeconomic environment. Minor undesired effects that any construction along the proposed route may have are: expansion of the area occupied by flammable, exotic, annual plant species; a temporary reduction in available forage for wild horses and/or wildlife; a temporary increase in degradation of visual resources; and a temporary increase in fugitive dust emissions.

Any construction along the proposed route would utilize best management practices and because of this, there would be no significant remaining effects for which mitigation is required.

The proposed FOL route would traverse valley bottoms over most of its length. The route would leave the bottom lands only to go over low passes in the Fallout Hills (Hungry Hill Summit), at Chalk Mountain Pass at the north end of Emigrant Valley, and an unnamed pass at the north end of the Belted Range.

All of the proposed and alternate routes would be superimposed on or immediately adjacent to existing roads constructed in the alluvial/fluvial sediments deposited in the lower portions of the valley floors. The alternate route would follow US Highway 95 northward from Indian Springs AFAF to the turn off to Tolicha Peak. From there, the route would run adjacent to the Tolicha Peak facility access road.

The proposed FOL route would not cross, or come into contact with any perennial streams, any springs, or any spring-fed riparian/wetland areas. All surface water features are ephemeral, and are a direct response to storm events. Because of low topographic relief along most of the route, potential for erosion is not high.

Air emission data from remote Nevada locations generally show that most pollutant concentrations are well below the legal standards; however, ambient concentrations of ozone and PM_{10} may approach the standards. Low levels of human activity suggest that the high concentrations result from natural processes. The other criteria pollutants are directly related to anthropogenic causes, but concentrations should be much lower than the NAAQS, because industrial activity (including travel) along the proposed route is low.

The FOL route would traverse parts of the Mojave Desert and Great Basin Desert biomes, and the transition zone between the two biomes. Wetlands and/or riparian areas are not present on or near the route. The entire route was surveyed for floral species of concern (SOC) when growing conditions were marginal, therefore, the survey results could not be used to definitively conclude that one or more SOC were absent, and would not be adversely affected. An analysis for the presence/absence of potential habitat, and other ancillary factors strongly suggested that no SOC would be affected.

Common wildlife found year-round include small and large mammals, reptiles and birds. The desert tortoise (*Gopherus agassizii*), peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*) are the only threatened or endangered fauna that may occur in the project area. Two candidate fauna and 17 SOC have distributions that overlap with the proposed FOL route. A biological survey and an analysis of species' habitat requirements strongly suggests that no SOC regularly use the project area.

Livestock grazing is only allowed in the Bald Mountain Allotment, and is unaffected by the proposed action.

The proposed FOL route would be located on, or immediately adjacent to, existing roads or related disturbances, therefore, any FOL related construction (i.e. trenching) would not represent a long-term degradation to the visual resources.

None of the infrastructure on the NAFR would be affected by the proposed action. The proposed FOL route does not go through any mining districts, and would not affect any mineral resources.

On the DNWR, an existing right-of-way (8.5 m (28 ft)) on each side of the center line of the road followed by the FOL route would prevent intrusion of the FOL route into proposed wilderness areas.

Hunting is the only recreational activity allowed on the NAFR and it will not be affected by the proposed or alternative actions.

A total of 134 cultural resources were identified, but only 13 were recommended to be eligible for nomination to the *National Register of Historic Places*. None of these resources would be affected by the proposed or alternative actions.

ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION

Neither the proposed action, nor the alternate route, should have a significant adverse environmental impact. All impacts from any construction along the proposed route are expected to have limited areal extent and to be only temporary in nature. The proposed route follows, and is within the right-of-way of an existing road and falls on existing disturbances.

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1.0 PURPOSE OF THE PROPOSED ACTION

The US Air Force (USAF) proposes to establish a fiber optic line (FOL) route on the Nellis Air Force Range (NAFR) complex. This route is designed to allow FOL transmission of data on Air Force training, testing and evaluation related to air- and ground-based systems. The proposed action would provide a route for FOL communication from Indian Springs Air Force Auxiliary Field (AFAF) to Cedar Pass Facility in Cactus Flat, on the NAFR North Range. The proposed FOL route goes northward through Indian Springs Valley, turns northwestward and westward across Emigrant Valley, the southwest corner of Sand Springs Valley, the southern end of Southern Railroad Valley, and then crosses the Kawich Range at Cedar Pass into the Cactus Flat/Gold Flat area west of the Kawich Mountain Range. Figure 1 shows the general location of the NAFR Complex, and Figure 2 shows the proposed FOL route and a potential alternate route that could also provide a communication pathway to the NAFR North Range. This alternate route, which would follow US Highway 95, however, goes to the southern, rather than to the northern end of the North Range. A FOL network is currently in place from Nellis AFB to Indian Springs AFAF, and on the NAFR North Range. The proposed FOL route would connect these disjunct segments, and enhance communication capabilities.

1.1 Need for the Proposed Action

The FOL system used in this project is state-of-the-art communication equipment. Employing this system, data regarding aircraft and ground-based systems can be quickly and accurately transmitted directly to the control and analysis point to aid in formulating and evaluating United States defense strategies and tactics. Because of the sensitive nature of the information being transmitted it must remain secure; radio or microwave data transmission are not feasible. The real-time nature of the data analysis precludes use of electromagnetic media, such as tapes and disks, for data transfer.

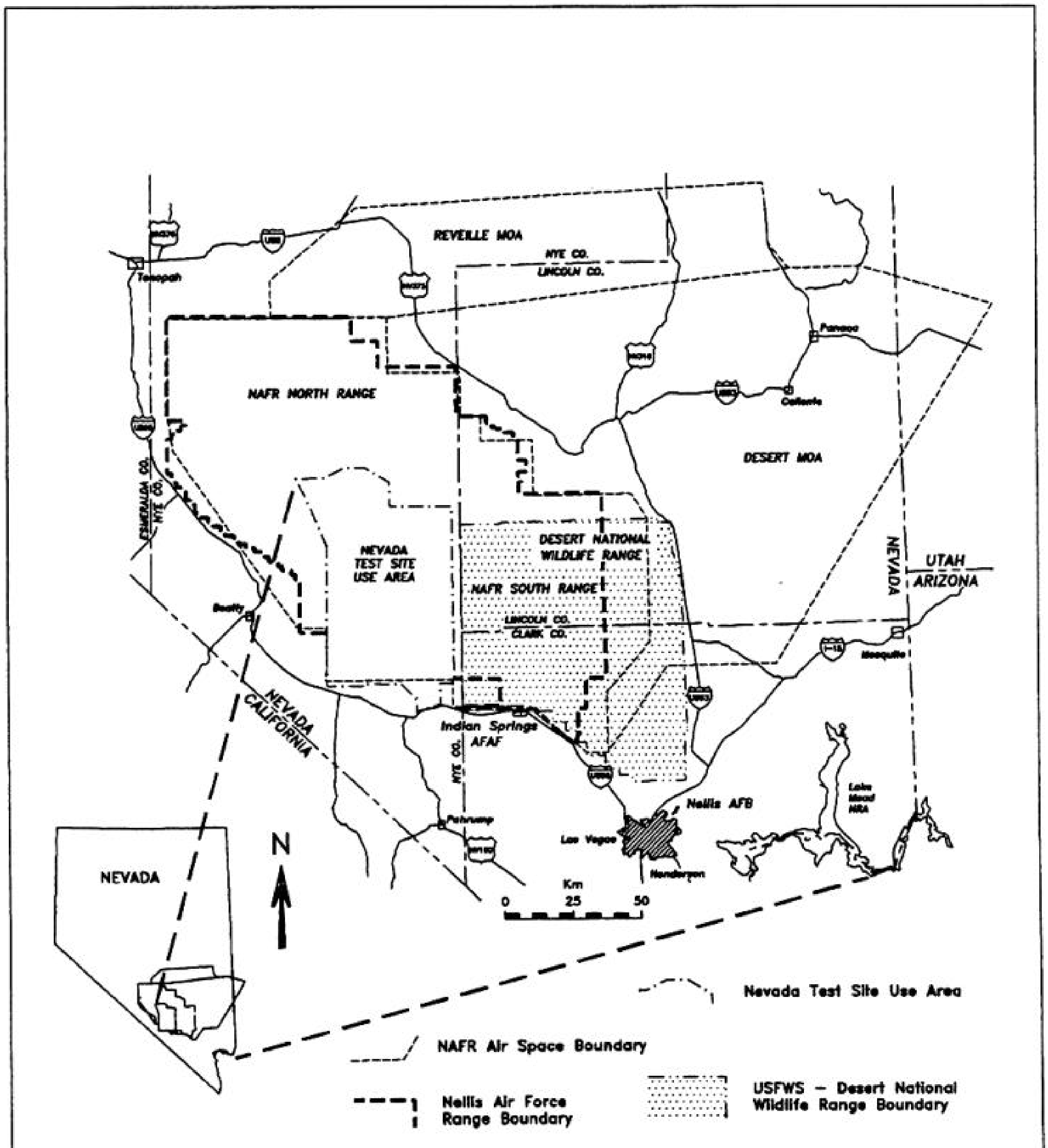

Figure 1. Regional Location Map, Nellis Air Force Range Complex

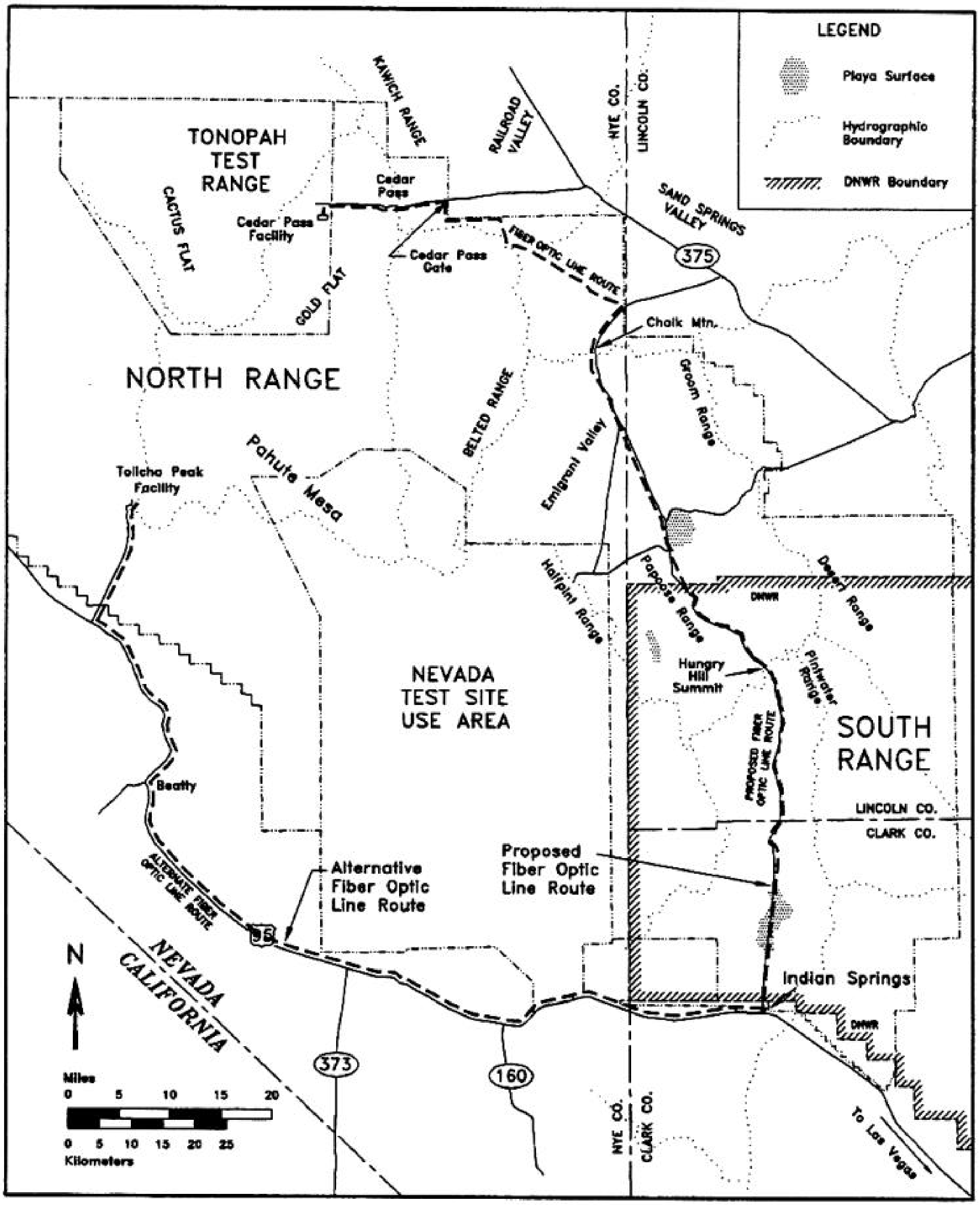

Figure 2. Proposed and Alternate Fiber Optic Line Routes from Indian Springs AFAF to the NAFR North Range at Cedar Pass Facility and Tolicho Peak Facility, Respectively

1.2 National Environmental Policy Act considerations

This Environmental Assessment (EA) is prepared pursuant to Section 102 of the National Environmental Policy Act of 1969 (NEPA), as implemented by the regulations promulgated by the President's Council on Environmental Quality (CEQ, 1978) and Air Force Instruction 32-7061 (USAF, 1994). The objective of NEPA is to ensure that the federal decision-making process considers the environmental aspects of proposed actions before decisions are made and actions are taken. The EA must contain a clear explanation of the proposed action, an evaluation of the natural resources present, a description of alternative actions, and an estimate of the environmental impacts of all alternative actions. Also, it briefly provides sufficient evidence and analysis to determine whether or not to prepare an Environmental Impact Statement or a Finding of No Significant Impact (FONSI) (40 CFR 1508.9). The Air Force would comply with all of the requirements contained in the Clean Air, Clean Water, Endangered Species, and the National Historic Preservation Acts as they may apply to the proposed action.

1.3 Existing Operations and Site Conditions

Operations on the NAFR are directed at pilot training and weapons system evaluation to provide the United States with the most efficient and effective defensive capability possible. The activities on the ranges include management and operational support of live-fire bombing and gunnery targets, ground-controlled intercept radars; optical tracking stations and electronic communications facilities. Infrastructure to support these activities include paved and unpaved roads and airstrips, operational support complexes of dormitories, dining halls, shops, garages, water supply and waste water treatment systems. This infrastructure is widely distributed across the NAFR Complex.

1.4 Inter-relationships with Other Agencies

The proposed FOL route would traverse through valleys that are withdrawn from public access and are administered jointly by the Air Force, US Fish and Wildlife Service (USFWS), and/or US Bureau of Land Management (BLM). Indian Springs Valley and the southern half of Emigrant Valley are managed by both the Air Force and the USFWS (see Figure 2). Joint management of this area is done under a Memorandum of Understanding (MOU) between the two agencies. The northern half of Emigrant Valley, Sand Springs Valley and Southern Railroad Valley are administered jointly by the Air Force and BLM. The BLM responsibility is restricted to natural resources management. The alternative FOL route, over most of its length, would be within the US Highway 95 right-of-way and thus coordination with the Nevada Department of Transportation would be required.

Coordination with other agencies occurs through the "Five Party Agreement" signed by the Air Force, U.S. Department of Energy, U.S. Fish and Wildlife Service, the U.S. Bureau of Land Management, and the Nevada ~~Department of Fish and Game (now the Division of Wildlife Resources)~~ State Clearinghouse. The Air Force works in close cooperation with the Nevada Division of Environmental Protection (NDEP), Division of Wildlife Resources (DWR) and the State

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Historic Preservation Office (SHPO) to insure compliance with all pertinent laws and statutes.

1.5 Anticipated Environmental Impacts

Because the FOL route would be placed within disturbed areas or in adjacent rights-of-way, the proposed action would not disturb any historical/cultural resources in the area. Further, because any land surface disturbed by any construction along the route would be returned to the pre-disturbance grade, erosion would not be anticipated. There are no effects anticipated either on water quality/quantity, or on the regional socioeconomic environment.

Negative effects from any construction along the proposed route may include:

1) Temporary expansion of the area occupied by flammable, exotic, annual plant species,
2) A temporary reduction in available forage for wild horses and wildlife,
3) A temporary increase in degradation of visual resources, and
4) A temporary increase in fugitive dust emissions.

2.0 ALTERNATIVE ACTIONS

Four actions, including the proposed action, have been considered for this project. The alternatives are: "No Action", "Alternative Data Transmission Technologies", and "Alternate Routing".

2.1 No Action

Under this alternative, the project would not occur. The No-Action alternative is unacceptable to the Air Force because the national defense objectives of this project would not be met. The No-Action alternative would not result in any change of use of the NAFR.

2.2 Alternative Data Transmission Technologies

Alternative data transmission technologies include radio and/or microwave transmission. Radio or microwave transmission is not feasible because the nature of the information to be transmitted requires encryption. Approved encryption methods by the National Security Agency (NSA) require that the data be digitized before encryption can be accomplished. This increases the bandwidth required for transmission, and rules out the economical use of free space radio/microwave transmission. For example: the bandwidth required for data transfer from the NAFR is 2,160 megabits/second. This can be accomplished over a single pair of fibers. If state of the art microwave radio systems were used, 16 separate radio links would be required. The required logistical and maintenance effort associated with a radio system of this magnitude is not acceptable to the Air Force. Also, radio/microwave systems are highly susceptible to electromagnetic interference (EMI) and radio frequency interference (RFI) which diminishes reliability.

The real-time application of the data precludes use of electromagnetic media, such as tapes or disks, for the data transmission.

2.3 Alternate Routing

One alternative FOL route has been identified. That route would place the FOL within the US Highway 95 right-of-way, from the Indian Springs AFAF to just north of Beatty, where the route would follow the existing Air Force road alignment from Highway 95 to the Tolicha Peak Facility at the southern end of the North Range complex. At Tolicha Peak the alternative FOL route would be joined to the North Range FOL network. Construction of a FOL along this route, which is shown on Figure 2, would involve approximately 170 km (106 mi) of FOL. While this option is technically feasible, the fiber between Indian Springs and the Tolicha Peak turnoff from Highway 395 would have to be installed aerially, which would increase installation cost and decrease overall system reliability by exposing the cable to the elements and possible vandalism.

2.4 Proposed Action (preferred alternative)

2.4.1 Proposed Routing

As shown in Figure 2, the proposed FOL route goes northward from Indian Springs AFAF along an existing road to the north end of Indian Springs Valley where it crosses into Emigrant Valley over Hungry Hill Summit. The transit across Emigrant Valley is superimposed on existing roads to just north of the Papoose Range where the route cuts across the valley floor along an existing utility alignment to join the Valley Road alignment. The route then follows that road into Sand Springs Valley where it next follows older dirt roads into Southern Railroad Valley. At the Cedar Pass Gate, the FOL becomes an above-ground facility and is located on existing power poles for its transit across Cedar Pass, to its tie-in at the Cedar Pass Facility.

A FOL along the proposed route would involve approximately 166 km (103 mi) of underground FOL and 21 km (13 mi) of above-ground FOL; a total of 187 km (116 mi) of fiber optic line. The underground portion of the fiber optic route would begin at Indian Springs AFAF, and end at the Cedar Pass Gate, on the eastern side of the Kawich Range. The remaining 13 miles would be above ground on existing power line poles. A trenching-laying machine is used to install underground FOL. Any trench constructed would be more than 0.6 m (2 ft) wide, although the track width would be approximately 3 m (10 ft).

2.4.2 Standard Construction Practices

Construction along the proposed route would utilize best management practices and because of this, there would be no significant remaining effects for which mitigation is required. The following management practices would be employed:

1. All sources of any liquid would be sealed or covered to prevent accidental consumption by wildlife.

2. All construction and personal debris (e.g. coke cans, lunch containers, etc) would be removed following completion of the construction effort.

3. Open trenches would not be left overnight. Trenches left open overnight increase the potential for ungulates and/or tortoises to accidentally fall into a trench and die. For tortoises and wild horses such incidents could be violations of the Endangered Species Act and the Wild Horse and Burro Act, respectively.

3.0 AFFECTED ENVIRONMENT

3.1 Physiography, Geology and Soils

The proposed FOL route would traverse valley bottoms over most of its length from Indian Springs AFAF to the Cedar Pass gate. The route would leave the bottom lands only to go over low passes at the Fallout Hills at the north end of Indian Springs Valley (Hungry Hill Summit), at Chalk Mountain Pass at the north end of Emigrant Valley, and over the pass referred to as Monotony Valley between Sand Springs Valley and Southern Railroad Valley.

All of the proposed route, as well as the alternate route, would be located on or adjacent to existing roads, utility alignments, or fall on previously disturbed habitat. The existing roads were constructed in the alluvial/fluvial sediments deposited in the lower portions of the valley floors where road building was easier than in areas of exposed bedrock. Less than five percent of the entire proposed FOL route from Indian Springs to the Cedar Pass facility passes through areas of exposed bedrock. From the southern terminus at Indian Springs, the proposed route would extend northerly for approximately 105 km (65 mi) over alluvial, fluvial and playa sediments of Indians Springs Valley before encountering partial bedrock exposures in the canyon leading to Hungry Hill Summit. This canyon represents the contact between Paleozoic carbonate rock along the eastern wall and tertiary volcanic rock exposed along the western slope. There is no evidence of mineral alteration or prior mining activity along this contact, and no record of mining claims located in this area, even though this was a primary historic transportation route. As the proposed route nears the divide at Hungry Hill Summit, the contact is buried beneath older clastic rocks and unmineralized tertiary tuffs and tuffaceous sediments and these are, in turn, buried by the younger quaternary sediments of Emigrant Valley.

Emigrant Valley is defined by the Belted Range on the west, the Halfpint Range on the southwest, the Buried Hills and Pintwater Range to the south, the Desert Range and Jumbled Hills on the east and the Groom Range to the northeast. The Papoose Range and several low carbonate hills rise above the valley floor, and are completely surrounded by the alluvial sediment. The existing road that the proposed FOL route would be superimposed on throughout Emigrant Valley was constructed on alluvial sediments. The route passes near exposed bedrock along the east side of the Papoose Range, approximately 1 km (0.6 mi) east of the Kelly mining district. This is the route's closest proximity to any known potential mining district.

The proposed route passes from Emigrant Valley into the southern portion of Sand Springs Valley through a low divide near White Blotch Springs. From this point, to the eastern approach to Cedar Pass in the Kawich Range, a distance of 52 km (32 miles), the route is primarily on valley-fill sediments and some unaltered Tertiary volcanic tuff. At Cedar Pass, the above-ground portion of the route traverses the northern fringe of an area of hydrothermally altered dacite and tuff of the Kawich Range for a distance of less than 3 km (2 miles). This area was heavily prospected, probably during the height of the mining activity at the nearby Silverbow and Gold Reed mining districts, but no production was reported. The draft of the Mineral and Energy Resource Assessment of the Nellis Air Force Range (Nevada Bureau of

Mines and Geology, Oct. 1996) reported no identified mineral resources in the Cedar Pass area. From the western slope of Cedar Pass to the northern terminus at the Cedar Pass facility the fiber optic route is on valley-fill sediments.

The alternate route for the fiber optic line follows US Highway 95 from Indian Springs AFAF northwesterly for approximately 148 km (92 mi) to the turn off to Tolicha Peak. From the turn off, the route veers to the northeast, adjacent to the access road to the Tolicha Peak facility. Similar to the roads that the proposed FOL route follows, US Highway 95 and the Tolicha Peak access road were constructed away from the mountain ranges when possible to avoid steep grades and high construction costs. Very little of the alternative route passes through areas of bedrock. Not until the alternative route approaches the northern terminus at the Tolicha Peak facility would any identified mining district be approached. The existing access road crosses the western edge of the central Tolicha mining district for a distance of approximately 500 meters (1,600 ft).

Soil throughout the route alignments varies in depth, with shallow soil occurring on the hillsides and deeper soil on the alluvial fans and valley bottoms. The valley-bottom soil tends to be fine grained silts and clays and is poorly drained. The alluvial soil has a sandy loam fine earth fraction, and large amounts of gravel and cobble. The soil on steep slopes is modified by high amounts of gravel, cobble, stones, and boulders.

3.2 Climate

In Table 3-1 selected climatic parameters from meteorologic stations located on the Tonopah Test Range, the Nevada Test Site (Yucca Flat) and Indian Springs AFAF are summarized. The annual precipitation ranges from approximately 180 mm (7.0 in) at Yucca Flat to 86 mm (3.4 in) at Indian Springs. In central and southern Nevada, there is a direct relationship between the annual depth of precipitation and elevation. On the highest peaks along the proposed and alternate FOL route alignments, the mean annual depth of precipitation may be as much as 300 mm (12 in) or more (French, 1983 and 1986). Most precipitation occurs during the winter months as the result of Pacific frontal systems; however, summer thunderstorms are common during some years. At the higher elevations, snowfall accumulations may be significant, with the greatest accumulations occurring on the north facing slopes.

Daily and seasonal temperatures vary greatly along the proposed and alternative FOL route alignments and are influenced by both general air movement and topography. With reference to Table 3-1, the lowest temperatures occur in January and highest in July and August. At the northern end of the alignments (Tonopah Test Range), the lowest mean minimum temperature is approximately -7 °C (20 °F); in the central portion of the alignments (Yucca Flat), approximately -6 °C (21 °F); and at the southern end of the alignment (Indian Springs AFAF), -5 °C (23 °F). At the northern end of the proposed alignment, the highest mean maximum temperature is approximately 32 °C (89 °F); in the central portion of the alignments, approximately 36 °C (97 °F); and at the southern end of the alignment, 40 °C (104 °F).

There are no evaporation or evapotranspiration data for the stations listed in Tables 3-1 or in the surrounding area. The Nellis Air Force Range withdrawal EIS (USAF, 1977) used data from the Environmental Data Service of the Department of Commerce to characterize the entire range complex as having annual lake evaporation rates of 147 to 183 cm per year (58 to 72 inches per year). Actual evapotranspiration is limited by available soil moisture and given the depth to the water table (over 200 m (660 ft)) must be less than the estimated annual potential lake evaporation.

Table 3-1. Summary of climatic data for three stations in Central and Southern Nevada: Tonopah Test Range, Yucca Flat and Indian Springs AFAF.

Parameter Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann Avg
<u>Tonopah Test Range</u>													
Mean Max Tmp (°F)	41	48	56	64	73	84	89	86	76	66	51	43	64
Mean Min Tmp (°F)	20	26	32	38	46	56	61	59	50	40	28	22	39
Mean Dew Pt Tmp (°F)	15	18	20	21	25	29	33	36	28	24	19	16	23
% Rel Hum, 0700PST	62	59	52	41	36	30	30	37	37	46	53	62	46
% Rel Hum, 1300PST	45	37	29	22	19	16	18	22	20	24	35	42	28
Mean Precip (in)	0.43	0.25	0.72	0.38	0.45	0.21	0.71	0.85	0.36	0.51	0.54	0.39	5.65
<u>Yucca Flat</u>													
Mean Max Tmp (°F)	51	57	61	68	79	89	97	94	86	75	62	52	73
Mean Min Tmp (°F)	21	26	28	34	43	50	57	57	47	37	27	21	37
Mean Dew Pt Tmp (°F)	22	22	20	20	27	27	36	36	30	26	21	18	26
% Rel Hum, 0400PST	76	72	63	52	50	40	40	45	45	57	62	69	56
% Rel Hum, 1300PST	44	34	27	19	18	14	15	17	17	23	27	36	24
Mean Precip (in)	1.0	1.1	0.5	0.4	0.3	0.3	0.5	0.5	0.5	0.4	0.7	0.8	7.0
<u>Indian Springs AFAF</u>													
Mean Max Tmp (°F)	55	61	69	79	88	98	104	102	95	82	66	58	80
Mean Min Tmp (°F)	23	27	32	42	49	57	63	61	53	41	29	24	42
Mean Dew Pt Tmp (°F)	24	27	24	19	??	??	??	19	26	30	29	21	??
% Rel Hum	52	50	41	22	??	??	??	9	16	28	49	45	??
Precipitation (in)	0.40	0.33	0.25	0.30	0.13	0.10	0.46	0.29	0.26	0.25	0.37	0.30	3.4

?? Indicates missing data.

3.3 Hydrology and Water Resources

3.3.1 Hydrology

The proposed FOL route would cross no perennial stream courses nor would it go through, or adjacent to, any springs, or spring-fed riparian/wetland areas. The water resources of Indian Springs Valley, Emigrant Valley, Sand Springs (Penoyer) Valley, and Southern Railroad Valley are limited. There are no permanent streams or lakes in any of the valleys. All surface water features in the valleys are ephemeral, with stream channels conveying runoff from the mountains to the mid-valley playas only in response to storm events.

In Indian Springs Valley, five springs are the only permanent water features. Three of these springs (Quartz, Tim, and Sand) are located in the Pintwater Range on the east side of the valley. These springs are approximately 300 m (1,000 ft) above the valley floor and appear to have their source in the Pintwater Range. Indian and Cactus springs are located in the south end of the valley at the base of the alluvial fan developed on the slope of the Spring Mountains. At an elevation of approximately 1,000 m (3,000 ft), these springs are situated on the edge of the valley floor. Indian Springs has been described as a regional spring supplied by the regional carbonate aquifer (Hess and Mifflin, 1978). Indian Springs Valley is located within the Ash Meadows groundwater flow system (Rush, 1970). This system extends from Emigrant Valley in the north to Ash Meadows and Death Valley in the south.

There are twelve springs in Emigrant Valley. Nine (Cane, Miner, Disappointment, Cattle, Cliff, Indian, Pine, Naquinta, and Rosebud/Bullwack) springs are located in the Groom Range; two springs (Wire Grass and Johnnies Water) in the Belted Range and one spring (White Blotch) on Chalk Mountain. All of these springs are well above the valley floor and appear to receive recharge through the mountain on which they are located. None of the springs appear to be associated with a regional groundwater flow system.

Twelve springs in Sand Springs Valley (USGS, 1988) are the only permanent, natural water features of the valley. One unnamed spring is located at the northwest end of the Groom Range. Six springs (Tunnel, Penoyer, The Seeps, Modes, Rose, Wildhorse) are located along the east side of the valley in the Timpahute Range and Worthington Mountains. Three springs (McCutches, Mud, and Quinn Canyon) are located at the north end of the valley in the Quinn Canyon Range. All of the springs, except Sand Spring, are located well above the valley floor which indicates they receive recharge through the mountain on which they are located. None of the springs are thought to be associated with a regional groundwater flow system. Sand Spring, which discharges at 30 °C (86 °F) is considered to be a thermal spring (Van Denburgh and Rush, 1974).Available information indicates that Sand Spring Valley is a hydrologically closed basin (Van Denburgh and Rush, 1974); and, thus, there is no subsurface flow into or out of the basin. The presence of the thermal Sand Spring, the outcropping of carbonate rocks in the Worthington Mountains, and the potential error in estimates of recharge and evapotranspiration for the valley may provide reason to reconsider the closed basin conclusion.

There are fourteen wells and springs identified on the topographic map of Southern Railroad Valley (USGS, 1988) Three springs are located on the east slope of the Kawich Range; three are located on the east and northeast slopes of the Reveille Range; and two are located in the south end of the Quinn Canyon Range. Six wells are indicated on the topographic map (USGS, 1988) and are located on the valley floor lowlands. Most of these wells are south of the playa lakebed. Railroad Valley is the largest closed basin in Nevada extending more than 177 km (110 mi) north-south and having a width of 24 to 40 km (15 to 25 mi). Southern Railroad Valley occupies approximately one-third of this area. Groundwater flow in southern Railroad Valley is from recharge areas in the mountains toward the central valley lowlands.

3.3.2 Erosion

A natural channel system is continually evolving, changing its location and shape in response to fluid forces acting on its bed and banks. These changes can be slow or rapid and can result from natural environmental changes (e.g. climatic change) or anthropogenic changes (e.g. burying a fiber optic cable). When a natural channel is modified locally, the change frequently causes alterations upstream and downstream.

The route of the fiber optic cable from Indian Springs AFAF to Cedar Pass would include many crossings of ephemeral stream channels. Most of the route is well down gradient of the mountain fronts and the topographic relief is relatively slight; therefore, the erosion potential is slight. A review of the alignment indicated that there is only one location with high concern for erosion and deposition. This location is the "canyon area" between Indian Springs Valley and Hungry Hill Summit.

The watersheds and sub-basins tributary to the canyon area are shown in Figure 3. Table 3-2 shows the regional regression equations for estimating the peak flow rates of various return periods (RP) (Thomas et al, 1994). Estimated peak flow rates (Table 3-3) were developed using these regional regression equations. With regard to the data in Table 3-3, the estimated peak flows are only for the watershed indicated. That is, the events are independent of each other. The peak flows with a return period of 2-years are quite small, and the peak flows with a return period of 25-years are an order of magnitude larger. Flow rates with return periods greater than 25-years were not considered because it was not felt that the economic value of a fiber optic line warranted their consideration.

In Table 3-4, peak flow rates of various return periods are summarized for groups of sub-basins. The event that occurs on the average once every 25-years at the mouth of the canyon has an estimated peak flow of 74 m^3/s (2,600 ft^3/s).

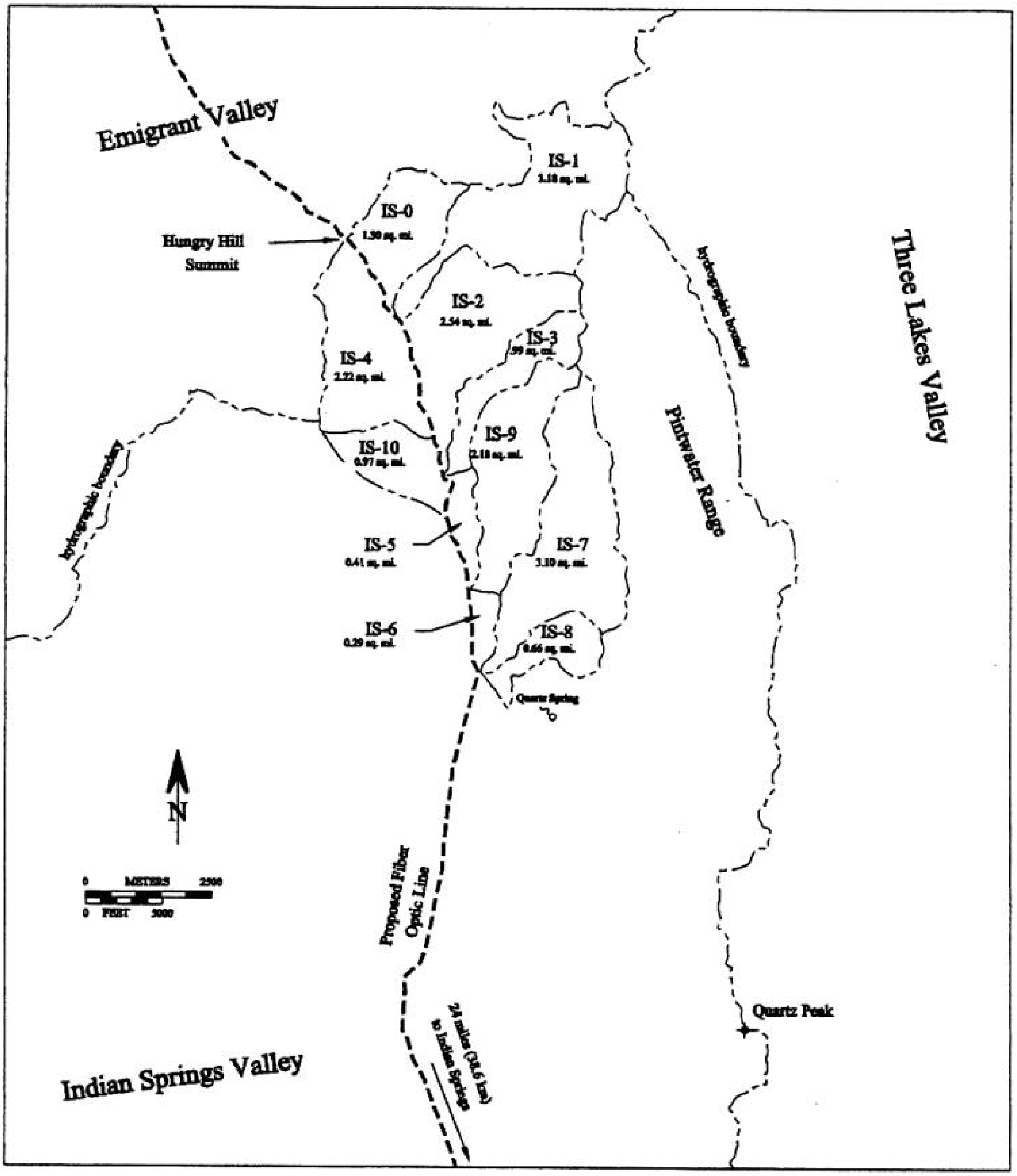

Figure 3. Location of watersheds analyzed for erosion potential at the north end of Indian Springs Valley

For the purposes of this investigation, the approaches to estimating scour depth ascribed to Lacey and Blench were used (Pemberton and Lara, 1984). Samples of the material composing the bed of the channel were obtained from five locations in the Canyon area, (see Figure 4). The mechanical analyses of these samples are summarized in Figure 5, and the median size of the material is approximately 5 mm (Figure 5). The widths of the channels formed by the peak flows were estimated using the "Dawdy" equation (Dawdy, 1979). In Table 3-5, depths of scour, estimated using the Lacey and Blench methods, are summarized as a function of flow rate. In this table, y is the depth of water; d_s is the depth of scour below the existing bottom of the channel; and therefore, $(y+d_s)$ is the estimated depth below the existing ground surface.

Table 3-2. Summary of regional regression equations for estimate peak flow rates of various return periods for watersheds in Region 10 (Thomas et al, 1994).

Return Period (yrs)	Equation
2	$Q_2 = 12A^{0.58}$
5	$Q_5 = 85A^{0.590}$
10	$Q_{10} = 200A^{0.62}$
25	$Q_{25} = 400A^{0.65}$

where A = watershed area (mi^2), and Q = peak flow rate (ft^3/s).

Table 3-3. Summary of peak flow rates with various return periods for the watersheds shown in Figure 3

		Peak Flow (cfs) Associated with Specified Return Period, Q_n			
Sub-Basin	Area (mi^2)	R.P. = 2 yrs	R.P. = 5 yrs	R.P. = 10 yrs	R.P. = 25 yrs
IS-0	1.3	14	99	240	470
IS-1	3.2	24	170	410	850
IS-2	2.5	20	150	350	730
IS-3	1.0	12	85	200	400
IS-4	2.2	19	140	330	670
IS-5	0.4	7	50	110	220
IS-6	0.3	6	42	95	180
IS-7	3.1	23	170	400	830
IS-8	0.7	10	69	160	320
IS-9	2.2	19	140	330	670
IS-10	1.0	12	85	200	400

Table 3-4. Summary of peak flow rates of various return periods for combinations of watersheds.

			Peak Flow Associated with Specified Return Period, (cfs)			
Reach	Contributing Sub-Basin Number	(mi^2)	R.P. = 2 yrs Q_2	R.P. .= 5 yrs Q_5	R.P. = 10 yrs Q_{10}	R.P. = 25 yrs Q_{25}
1	IS-0	(1.3)	14	99	240	470
2	IS-0, IS-1	(4.5)	29	210	510	1,100
3	IS-0, IS-1, IS-2, IS-9	(9.2)	43	320	790	1,700
4	IS-0, IS-1, IS-2, IS-9, IS-3, IS-10, IS-5	(11.6)	50	360	910	2,000
5	IS-0, IS-1, IS-2, IS-9, IS-3, IS-10, IS-5, IS-6, IS-7, IS-8	(17.9)	64	470	1,200	2,600

Table 3-5. Estimated depths of flow and total scour for various flow rates.

Flow Rate (cfs)	Lacey			Blench		
	y (ft)	d_s (ft)	y+d_s (ft)	y (ft)	d_s (ft)	y+d_s (ft)
5	0.1	0.1	0.2	0.1	0.1	0.2
10	0.2	0.2	0.4	0.2	0.2	0.4
25	0.3	0.2	0.5	0.3	0.2	0.5
50	0.3	0.3	0.6	0.3	0.3	0.6
100	0.4	0.4	0.8	0.4	0.4	0.8
200	0.6	0.4	1.0	0.6	0.5	1.1
400	0.8	0.6	1.4	0.8	0.7	1.5
600	0.9	0.6	1.5	0.9	0.8	1.7
800	1.0	0.7	1.7	1.0	0.9	1.9
1000	1.1	0.7	1.8	1.1	1.0	2.1
1500	1.3	0.9	2.2	1.3	1.2	2.5
2000	1.5	0.9	2.4	1.5	1.3	2.8
2500	1.6	1.0	2.6	1.6	1.4	3.0

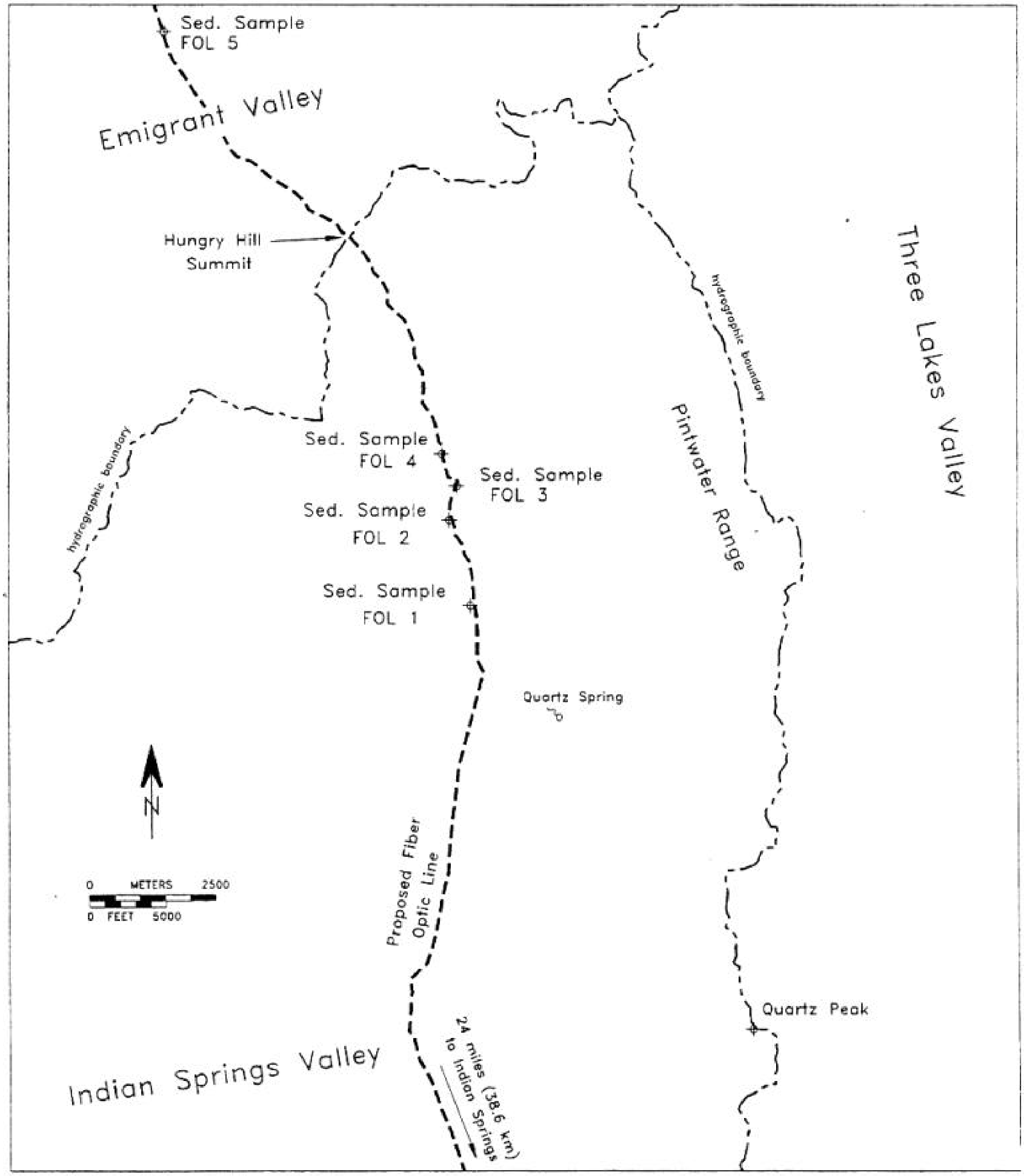

Figure 4. Location of samples taken for grain size analysis

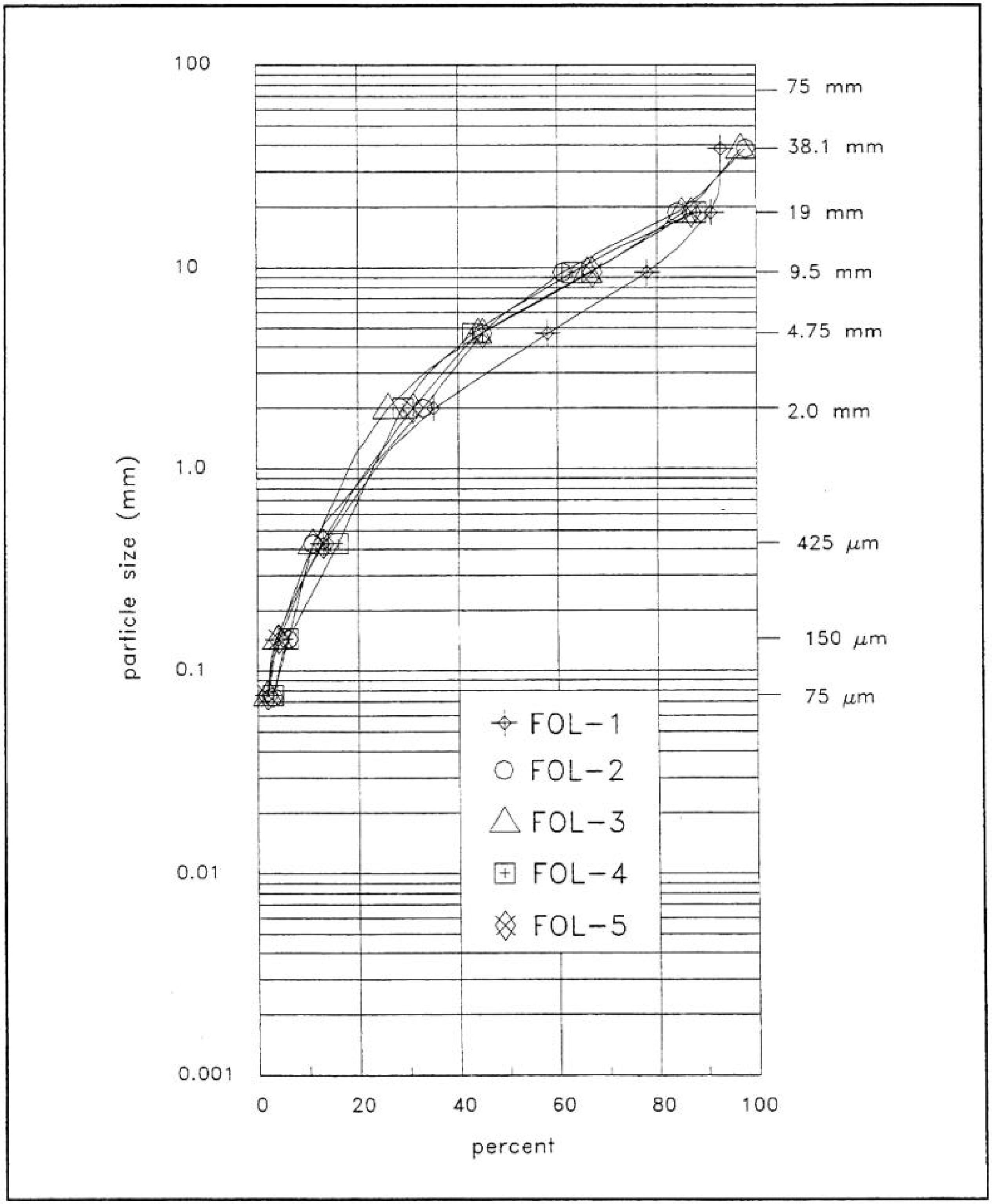

Figure 5: Results of the mechanical analysis of bed material samples.

3.4 Air Resources

3.4.1 Air Quality

The Clean Air Act (CAA) of 1963, as amended in 1965, 1967, 1977 and 1990, is the Federal statute that establishes policy relative to ambient air quality. The fundamental goals of the CAA are to protect and enhance the nation's air quality and to safeguard public health and welfare. The standards for assessing achievement of these goals are specified in the National Ambient Air Quality Standards (NAAQS). The four-pronged strategy designed to accomplish the goals includes the National Emission Standards for Hazardous Air Pollutants (NESHAP) the New Source Performance Standards (NSPS), the stationary air pollutant emission source construction and operating permit programs, and the mobile source emission control program. The primary NAAQS levels were established to protect human health, providing an adequate margin of safety. Secondary NAAQS are defined at levels to meet social welfare and environmental concerns, such as, protection of crops and vegetation, protection of materials, effects on transportation, and effects on personal comfort and general well-being. The NESHAP program is targeted for pollutants that are considered more dangerous to public health than the criteria pollutants regulated by the NAAQS. The CAA also requires each state to develop a State Implementation Plan (SIP). The foremost goal of the SIP is state implementation, maintenance, and enforcement of the NAAQS. The SIP contains the state's plan for regulating new and existing sources of air pollutants such that emission levels are reduced in non-attainment areas so as to reach attainment of the NAAQS within a specified time-frame. For areas currently in attainment, the SIP must contain procedures for the Prevention of Significant Deterioration (PSD) of air quality. In Nevada, the agency responsible for enforcing air quality is the Nevada Division of Environmental Protection (NDEP), Bureau of Air Quality. The Nevada SIP is found in the Code of Federal Regulations (CFR), Tittle 40, Part 52.1470. The Nevada Air Pollution Control regulations are set forth in the Nevada Administrative Code Chapter 445B.

Over most of its length the proposed FOL route is located within the Nevada Intrastate Air Quality Control Region (AQCR) which comprises most of the State of Nevada, with the exception of Clark and Washoe Counties. The portion of the route in Indian Springs Valley is within the Clark County Air Quality Control Region. A number of locations in the Nevada Intrastate AQCR have been classified as non-attainment areas. Since this route traverses a remote area, there are no monitoring data to support the designation of attainment and the area cannot be classified. A similar conclusion would be reached for alignments in many other remote areas.

Along the proposed FOL route there currently are few permitted air quality sources for existing operations. The existing operations within the general area of the proposed route are such that most of the primary emissions are related to travel on unpaved roads and motor vehicles.

3.4.2 Air Emissions

The NAAQS and Nevada standards for criteria pollutants are shown in Table 3-6. Given the limited anthropogenic sources it is expected that the air quality along the route meets these standards. The only readily observable degradation relates to suspended particulate matter which results from a combination of both natural processes and anthropogenic activities.

Data collected in remote Nevada locations generally show that concentrations of most constituents are much less than the legal standards; however, the ambient concentrations of ozone and PM_{10} may approach the standards. Causes of high ozone in remote locations in the southwest have been attributed to the transport of air from the southern California urban areas, and the intrusion of stratospheric ozone from high altitudes to ground level. Infrequent, relatively high concentrations of particulate matter in remote areas are generally due to sparse vegetation and periodic strong winds, which raise large amounts of soil particles into the air. The amount of suspended material is directly related to the type of land surface and the disturbance of that surface. In the valleys along the proposed route, travel on unpaved roads adds additional suspended material beyond that from natural processes.

The other criteria pollutants listed in Table 3-6 are directly related to anthropogenic causes and along the proposed FOL route alignment are likely to have background concentrations significantly lower than the NAAQS, due to the lack of industrial activity along that route.

3.5 Vegetation and Wildlife

3.5.1 Vegetation

Plant Communities

The FOL route (hereafter route) would traverse parts of the Mojave Desert and Great Basin Desert biomes, and their transition zone. Within each biome, numerous plant communities are bisected by the route; however, none have a unique species composition or structural characteristic. Wetlands and/or riparian areas are not present on or near the route.

On Indian Springs AFAF, the FOL route is located on the west side of the road leading northward in Indian Springs Valley. The vegetation has a high relative abundance of four-wing saltbush (*Atriplex canescens*) and cattle saltbush (*Atriplex polycarpa*), but low absolute cover. This part of the route has been extensively disturbed by previous activities. From the northern boundary of Indian Springs AFAF, northward for about 8 km (5 mi), the route is located on the west side of the road, which is located in a largely barren playa that is used extensively for bombing and gunnery practice. The lack of vegetation is due to constraints imposed by the sodic playa soil, not Air Force activities. From about 8 km (5 mi) north of Indian Springs AFAF to the southern end of Emigrant Valley, the route would be located in the center of the road.

Table 3-6 Nevada and National Ambient Air Quality Standards

Standards Pollutant	Averaging Time	National Standards Primary ug/m³	National Standards Secondary ug/m³	Nevada ug/m³
Ozone	1 hour	235	235	same
CO				
<5000 ft	8 hour	10,000	10,000	same
>5000 ft	"	6,700		
any elevation	1 hour	40,000	40,000	same
SO2	Annual Arithmetic Mean	80	80	same
	24 hour	365	365	same
	3 hour	1,300	none	1,300
NO2	Annual Arithmetic Mean	100	100	same
PM10	Annual Arithmetic Mean	50	50	same
	24 hour	*	150	same
Pb	Quarterly Arithmetic Mean	1.5	1.5	same
Visibility	Observation	Insufficient amount to reduce visibility to less than 30 miles when humidity is less than 70%		

Between 8 km and 22 km (5 and 14 mi) north of Indian Springs AFAF, the proposed route remains in the playa, and continues to traverse an active target area. From about the 22 km (14 mi) mark northward to the 1,097 m (3,600 ft) elevation contour, the route and the road pass through a Creosotebush/Bursage (*Larrea tridentata/Ambrosia dumosa*) plant community, with few perennial herbaceous species in the understory. The soil is very shallow and very rocky. This area is still part of the active bombing range, although targets are about 0.5 to 1.0 km (0.3 to 0.6 mi) from the route. Numerous craters on and near the route indicate that wayward bombs periodically fall on the proposed route.

From the 1,097 m (3,600 ft) elevation contour to the southern base of the Fallout Hills, the road and FOL route are on an alluvial fan vegetated with a northern Mojave Desert shrub community. There is a high relative abundance of creosotebush, bursage, Joshua tree (*Yucca brevifolia*), Nevada Mormon tea (*Ephedra nevadensis*), hopsage (*Grayia spinosa*), Indian ricegrass (*Oryzopsis hymenoides*), desert needlegrass (*Stipa speciosa*), wolfberry (*Lycium andersonii*), shadscale (*Atriplex confertifolia*), spiny menodora (*Menodora spinescens*), cholla (*Opuntia* sp.) and globemallow (*Spaeralcea ambigua*).

Throughout the Fallout Hills, the route and road pass through blackbrush (*Coleogyne ramiosissima*) and sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities. Both

communities are species poor, with blackbrush and sagebrush composing over 80 percent of the perennial plants in each community.

From the northern base of the Fallout Hills, northward to Groom Lake, the plant community is typical of northern Mojave Desert/Transition Desert scrub habitats, located on alluvial fans and plains. Common species are: wolfberry (*Lycium andersonii*); shadscale (*Atriplex confertifolia*) four-wing saltbush (*Atriplex canescens*), Nevada Mormon tea, spiny menodora (*Menodora spinescens*), little leaf rabbitbrush (*Chrysothamnus viscidiflorus*), winterfat (*Ceratoides lanata*), Joshua tree, Indian ricegrass, bud sagebrush (*Artemisia spinescens)*, globemallow, red brome (*Bromos rubens*), and spiny hopsage. The abundance of Yucca declines as the proposed route progresses northward.

Near Groom Lake the vegetation begins to have characteristics of true Great Basin plant communities. Below the late Pleistocene high-water mark, where old lagoons were present and/or ephemeral drainages are now common, the plant community has a high abundance of shadscale, winterfat, and gray molly (*Kochia americana*). These species typically inhabit landscape positions with accumulations of playa sediments. Other species present, but with a low absolute abundance are: Indian ricegrass, princes plume (*Stanleya pinnata*), four-wing saltbush, bud sage (*Artemisia spinescens*), and globemallow.

As the route progresses northward from Groom Lake, it moves off playa landforms and onto an alluvial plain. The relative abundance of species associated with playa landforms decreases, while upland species increase. Spiny hopsage, Nevada Mormon tea, wolfberry, Indian ricegrass, rabbitbrush (*Chrysothamnus greenii*), galletta grass (*Hilaria jamesii*), and squirreltail (*Sitanion hystrix*) increase, and shadscale, winterfat and gray molly decline. At the north end of Emigrant Valley, near Chalk Mountain, Wyoming sagebrush is the dominant shrub.

Near Chalk Mountain the route traverses a large burned area (about 8,900 ha (22,000 acres) in 1988), largely vegetated with perennial grasses and widely scattered shrubs. Abundant grasses are Indian ricegrass, desert needlegrass, and galletta grass. Cheatgrass (*Bromus tectorum*) is present but generally at low levels. The principal exception is rocky knolls with shallow soil. The most common shrub is Nevada Mormon tea. Sagebrush has been almost eliminated from the area.

North of the burned area, where the route traverses the southwest corner of Sand Springs Valley, the south end of the Quinn Canyon Range, and the north end of the Belted Range, sagebrush has the highest ground cover. Subordinate shrubs include: wolfberry, spiny hopsage, four-wing saltbush, rabbitbrush, horsebrush (*Tetradymia* spp.), shadscale, Nevada Mormon tea, and bud sagebrush. Perennial grasses periodically have a high relative abundance throughout this stretch, and include Indian ricegrass, desert needlegrass, and galleta grass. Squirreltail and three awn (*Aristida fendleriana*) are present in small amounts. Grazing is generally absent, except from wild horses (*Equus caballus*) on the west side of the Belted Range; therefore, the varying abundance of desired perennial grasses is probably due to constraints imposed by the soil and/or competitive interactions among life forms (e.g. shrubs vs grasses).

In Southern Railroad Valley, Wyoming sagebrush is the most conspicuous shrub above the 1,783 m (5,850 ft) contour. Other perennial species present include: Nevada Mormon tea, shadscale, bud sagebrush, galletta grass, and Indian ricegrass. Below the 1,783 m (5,850 ft) contour, the route traverses a shadscale community with a high relative abundances of rabbitbrush, Nevada Mormon tea, winterfat, bud sagebrush, galletta grass, and Indian ricegrass.

Annual Weeds

In Indian Springs Valley, north of the bare playa and south of the 1,097 m (3,600 ft) contour, red brome (*Bromus rubens*) is a common component in undisturbed plant communities. On disturbed sites annual weeds have even higher densities. Red brome, halogeton (*Halogeton glomeratus*), and Russian thistle (*Salsola* spp.) are common introduced species, while bristly fiddleneck (*Amsinkia tessellata*) is a common native species.

Above the 1,097 m (3,600 ft) contour in Indian Springs Valley and the Fallout Hills, the abundance of red brome is generally low in undisturbed communities, but remains high on disturbed sites (anthropogenic and natural). Repeated disturbance results in a high abundance of weedy species, with red brome the most common weed. Cheatgrass (*Bromus tectorum*) also begins to appear, and increases in relative abundance with increasing elevation (and winter precipitation)

In the south and central portions of Emigrant Valley, red brome and/or cheatgrass have a low abundance in undisturbed communities. Locations subject to repeated disturbance have a high abundance of red brome, cheatgrass, halogeton, Russian thistle, and/or tansy mustard (*Descurrania pinnata*). Halogeton is more common on alkaline soil with a silty texture, while the other species generally inhabit loamy soil. The brome grasses are the only species that may readily encroach into undisturbed plant communities.

In northern Emigrant Valley, cheatgrass becomes the primary weed. It is present in all locations, and its highest relative and absolute abundance are on regularly or intensely disturbed sites (e.g., shoulders of roads, borrow pits). Many older disturbances, however, have well established stands of perennial grasses despite the presence of cheatgrass.

The burned area in northern Emigrant Valley generally has a high relative abundance of cheatgrass though perennial grasses are also very abundant. The cheatgrass provides an easily dispersed seed source that can facilitate expansion. The abundance of perennial grasses, however, suggests that intensely disturbed areas can recover if the disturbance is not repeated at short intervals (minimum of 10-20 years).

From the south end of Sand Springs Valley to the east side of Southern Railroad Valley, cheatgrass is the most common annual weed. Its relative abundance, however, is low, except in washes with coarse soil. Wash locations periodically (probably 1-5+ years) have flowing water that reworks the soil (gravel) surface. This provides a good seedbed for cheatgrass and also buries perennial grasses that may become established.

In Southern Railroad Valley, the relative abundance of cheatgrass declines (but not to zero), and the relative abundance of Halogeton and Russian thistle increase, on both disturbed and undisturbed sites. The change in the relative abundance of weed species reflects changes in soil chemistry, soil texture, parent material, and probably micro climatic patterns. The increased relative abundance of weeds on undisturbed sites (i.e., no human activity) is probably due to widespread heavy and severe grazing by wild horses, throughout the growing season.

3.5.2 Threatened, Endangered, and Sensitive Species

Sensitive species (both flora and fauna) are those listed by the USFWS as threatened or endangered, and candidate species proposed for listing as threatened or endangered. Federal agencies also recognize species of concern (SOC), as sensitive species. Species of concern are those that are rare or are perceived to be rare, but whose existence is not immediately in danger. Their rarity, however, increases the threat of extinction when one or more populations are adversely affected. Because of their rarity, SOC are likely to become candidate species if populations throughout their range decline. Most current SOC were previously classified by the USFWS as category two (C 2) candidate species for listing as threatened or endangered, prior to recent changes in classification nomenclature (USFWS, 1996a; 1996b).

The entire route was surveyed when growing conditions for most SOC were marginal to poor. Between Indian Springs and Groom Lake, winter precipitation in the 1995-1996 rainy season was insufficient to facilitate much growth for most (if not all) SOC. Thus, the survey in April 1996 found poor growth of all species, including most non-sensitive perennials. The section between Groom Lake and Sand Springs Valley was surveyed during the summer and fall of 1996, and the section from Sand Springs Valley to the Cedar Pass Gate in July and early August 1997. The summer and fall surveys occurred after the growth period for most SOC was over, and for some species, after decomposition had probably begun. For some SOC, during some years, above-ground growth is not present by mid-to-late July. Because growing conditions during all survey periods were poor, the results from the biological surveys cannot be used to definitively conclude that one or more sensitive species were not present, and would not be adversely affected by any construction along the proposed route. Sensitive flora may not have been found because growing conditions were poor, not because sensitive flora are absent. An analysis of potential impact, therefore, must address the presence/absence of potential habitat, and other ancillary factors.

Knight et al. (1997) have conducted searches for SOC on much of the NAFR, and their report graphically displays the geographic location of all known populations of SOC on the NAFR. Table 3-7 summarizes the spatial location of these SOC with respect to the proposed FOL route. Data in Table 3-7 are from each USGS topographic quadrangle the proposed route passes through. When no species are known to occur on a quadrangle (for which the route passes through) data from the nearest known population on an adjacent quadrangle are used. Due to the ambiguity in taxonomical differences between *Cymopterus ripleyi* and *Cymopterus ripleyi saniculoides* data are for all *Cymopterus ripleyi* populations without differentiation of variety type are used.

The data show that one population of *Phacelia parishii* is the only population of a SOC that may be directly affected along the proposed route. Almost all locations are at least 1.0 km (0.6 mi) from the proposed route, with many over 10.0 km (6 mi) away.

In Indian Springs Valley, and for the 8 km (5 mi) segment immediately north of Indian Springs AFAF, two factors strongly reduce the possibility that sensitive flora are present. First, the entire area has been repeatedly disturbed by a variety of human activities. Among these are: road construction; the construction of drainage channels; the placement of air-to-ground targets; and air-to-ground target practice. These actions have reduced plant cover from perennial species, and converted many areas to halogeton. Second, this location is a silty playa, subject to periodic flooding. Parish phacelia (*Phacelia parishii*) is the only SOC known to occur on playa landforms subject to flooding (Knight et al., 1997). Approximately 30,000,000 individual Parish phacelia were present in April 1995 (Knight et al., 1997), after a much wetter than average winter. One of the two known populations would be intercepted by the route, but only where the route is on the existing road (Knight et al., 1997). Also, only the southeast corner of the population would be intersected. During the biological survey in 1996 not a single *Phacelia* plant was found. Winter precipitation in 1996 was well below average, and the abundance of Parish *Phacelia* is strongly correlated with precipitation during the winter prior to the growing season.

Table 3-7. The spatial relationship between SOC known to occur on the NAFR within 10.0 km (6 mi) of the proposed FOL route. Data are from Knight et al. (1997) except where noted.

Quad	Species	Distance (km) Between Proposed Topographic Route and Closest Population
Indian Springs	Arctomecon merriamii	3.0
Indian Springs NW	Phacelia parishii	0.0
	Arctomecon merriamii	2.5
Quartz Peak SW	Arctomecon merriamii	1.0
Tim Spring	Arctomecon merriamii	4.9
	Astragalus ackermanii	5.4
	Chrysothamnus eremobius	6.5
Quartz Peak	Arctomecon merriamii	2.7
	Astragalus ackermanii	5.4
Quartz Peak NW	Arctomecon merriamii	3.8
Fallout Hills	None	>10.0
Southeastern Mine	None	>10.0
Fallout Hills NW	Cymopterus ripleyi	8.0[a]
Papoose Range	Cymopterus ripleyi	2.0[a]
Groom Mine	Cymopterus ripleyi	4.0
Groom Mine SW	Cymopterus ripleyi	9.0
Groom Mine NW	None	>10.0
White Blotch Spring	None	>10.0
White Blotch Spring NW	None	>10.0
Monotony Valley	None	>10.0
Rhyolite Knob	None	>10.0

[a]Data from Bair, 1993

When the route emerges from the playa it would be located on alluvial plains and fans, until it reaches the southern base of the Fallout Hills. Soil on the alluvial material is derived from limestone, dolomite, and quartzite parent materials (Longwell et al., 1965). Elevation throughout this section is between 920 and 1,450 m (3,020 and 4760 ft). Numerous SOC inhabit this elevation range, on soil derived from calcareous parent materials (Table 3-8); however, most of these species inhabit landform locations that are not on alluvial fans, or inhabit soils with substantially different texture. Merriam bearpaw poppy (*Arctomecon merriamii*) typically inhabits desert flats with gravelly soil that is shallow, loose, and heavy with gypsum. The bearpaw poppy has previously been found near the Spotted and Pintwater Ranges where the mountain blocks meet an alluvial fan. These locations are generally several kilometers or more from the proposed route. Funeral Mountain milkvetch (*Astragalus funereus*), Sheep Range milkvetch (*Astragalus mohavensis* var *hemigyrus*), remote milkvetch (*Astragalus remotus*), and Clokey greasewood (*Glossopetalon clokeyi*) typically inhabit rocky slopes, cliffs, and/or other features with frequent natural disturbances, and shallow soil that is gravelly to rocky. Nevada orcytes (*Orcytes nevadensis*) typically inhabits hillslopes and dunes with sandy soil, while Rosy two-tone beardtongue (*Penstemon bicolor* ssp *roseus*) and Amargosa beardtongue (*Penstemon fruiticicormis* ssp. *amargosae*) inhabit washes with sandy to gravelly soil. At the north end of Indian Springs Valley on the upper alluvial fan, the road and proposed route are located in the middle of a large gravelly wash with several braided channels that are largely unvegetated, except where accumulations of sand and gravel have created mounds that rise above the channel's bottom. The road and route would remain on the unvegetated channel bottom. Pygmy poreleaf (*Porophyllum pygmaeum*) typically inhabits concave drainages on slopes, with gravelly soil. This landscape feature was present in undisturbed areas adjacent to the route; however, no pygmy poreleaf plants were found. The nearest known location is about 30 km (19 mi) east of the proposed route (Knight et al., 1997). Currant Summit clover (*Trifolium andimum* var. *podoecphalum*) typically inhabits hilltops, bluffs, or ridges.

In the Fallout Hills, the route would remain confined within the road. The elevation range is from 1,450 m to 1,610 m (4,760 and 5,280 ft), and the soil is derived from calcareous parent material. Based on the elevation range, parent material, and plant community (sagebrush or blackbrush) two additional SOC are potentially present in adjacent undisturbed plant communities. They are Currant milkvetch (*Astragalus uncialis*) and remote rabbitbrush (*Chrysothamnus eremobius*). Currant milkvetch typically inhabits knolls and slopes with saline sand and/or gravel. Remote rabbitbrush usually grows in cracks on cliff faces. Several of the species mentioned in the previous paragraph may also be found in the Fallout Hills.

In Emigrant Valley, except in the vicinity of Groom Lake, the route traverses coarse alluvial material derived from quartzite, rhyolite ash flows, and undifferentiated volcanic rocks. Several small inclusions of limestone and dolomite are present. Near Groom Lake, the soil is also derived from volcanic parent materials; however, soil texture is finer, being largely silt. The landforms are alluvial fans (upland locations) and plains (near the lakebed) and the elevation range is between 1,356 m and 1,646 m (4,450 and 5,400 ft). Wyoming sagebrush and shadscale are the principal components of most plant communities; but some nearly pure stands of winterfat occur near the playa.

Table 3-8. Habitat requirements for threatened, endangered, and candidate plant species, and SOC found on and near the NAFR.

Species	Plant Community	Flowering Period	Elevation Range (m)	Parent Material	Landform	Soil Characteristics
Arctomecon merriamii	Mojave Desert: *Larrea-Ambrosia, Atriplex; Coleogyne*	April-May	670-1465	Calcareous	Gravelly barren desert flats; hummocks and slopes	Shallow, loose gravelly heavy gypsum
Asclepias eastwoodiana	Great Basin; Mojave Desert Transition: *Atriplex; Sarcobatus*	May-June	1380-2105		Clay hills; shallow gravelly drainages	Alkaline; shallow; gravelly to clay
Astrasgalus ackermanii			1219-1890	Calcareous	Cliffs, ledges, crevices	Shallow to none
Astragalus aequalis	Juniper; Ponderosa pine; *Cercocarpus; Artemisia*	May-June	1798-2560	Calcareous	Dry hills and ridges	Gravelly; calcareous
Astragalus amphioxys var. *musinonu*	Mojave Desert: *Atriplex; Coleogyne*; scattered pinyon-juniper	April-June	1340-1920	Calcareous	Bajadas; gentle slopes; plains; disturbed areas	Gravelly; calcareous
Astragalus beatleyae	Great Basin: flatrock areas with scattered pinyon/juniper or *Artemisia nova*	May-June	1705-2073	Volcanic	Mesas with exposed masses of flatrock	Very shallow, gravelly
Astragalus eurylobus	Shadscale desert and grassland	April-June	1300-1900		Washes; gullied hills	Gravelly
Astragalus funereus	Mojave Desert: *Atriplex, Coleogyne; Hymenochlea*; scattered Pinyon-Juniper	March-May	980-2290	Mostly volcanics; occasional Calcareous	Unstable steep slopes; rock crevices; canyon walls; clay ridges openings; abandoned dirt roads	Shallow gravelly
Astragalus gilmanii	Great Basin; Mixed Mojave transition; *Lycium; Ephedra; Yucca; Atriplex Artemisia* to *Pinus/Juniperus*	June-July	1615-3050	Calcareous; volcanics	Hillsides; canyons	Rocky; gravelly
Astragalus mohavensis var. hemigyrus	*Larrea*; Hot Desert Juniper	April-June	1037-1709	Calcareous	Rocky slopes and cliffs	Rocky, gravelly, shallow
Astragalus oophorus var. *lonchocalyx*	Great Basin: Pinyon-juniper, *Artemisia* to *Pinus/Juniperus*	May-June	1830-2590	Calcareous	Gravelly hillsides; stony flats	Gravelly to stony; probably calcareous
Astragalus oophorus var. *clokeyanus*	*Pinus*: Open pinyon to ponderosa with Cercocarpus		1900-2740	Calcareous	Open slopes to ridges	Gravelly, moist to dry
Astragalus remotus	*Coleogyne; Juniperus; Larrea; Pinus Ponderosa; Quercus*	April-June	1219-1829	Calcareous; sandstone	Canyons: rocky hillsides	Gravelly; coarse; regularly disturbed

Table 3-8 (cont.). Habitat requirements for threatened, endangered, and candidate plant species, and SOC found on and near NAFR.

Species	Plant Community	Flowering Period	Elevation Range (m)	Parent Material	Landform	Soil Characteristics
Astragalus uncialis	Great Basin Salt Desert Shrub: *Atriplex; Sarcobatus; Artemisia Kochia*	May	1615-1845	Calcareous	Knolls; slopes	Saline sand and gravel
Camissonia megalantha	Mojave Desert:	June-October	610-2130	Light colored volcanics	Unstable loose substrates washes, talus slopes; and disturbed areas	Loose sandy; alkaline
Castillega martinii var. *clokeyi*	*Artemisia; Cercocarpus; Pinus; Populus*; pinyon-juniper	June-August	1890-1981	Calcareous; volcanics	Mountain slopes	Gravelly, dry
Chrysothamnus eremobius	*Artemisia; Coleogyne; Cercocarpus; Ephedra*	September-October	> 1524	Calcareous	Cliffs	Shallow to none
Cryptantha welshii	*Artemisia; Frasera; Chrysothamnus;* Lepedium; Phlox; Leptodactylon.	May	1494-1981	Volcanic	Mounds on alluvial fans and plains	White tuffaceous deposits
Cymopterus ripleyi var. *saniculoides*	Mojave and Great Basin: *Atriplex; Larrea; Coleogyne; Artemisia*	April-June	975-2042	Non-specific	Alluvial plains	Deep sandy
Epilobium nevadense	Pinyon; ponderosa pine; *Castileja*	July-September	2271-2804	Calcareous	Talus slopes; rock outcrops	Rocky; shallow
Erigeron ovinus	Great Basin: Pinyon; Ponderosa Pine; *Cercocarpus; Abies*	June	1890-2560	Calcareous	Rock outcrops, cliffs	Shallow; gravelly to rocky
Frasera gypsicola	*Artemisia; Stanleya*	June-July	1509-1584	Lakebed sediments	Old lakebeds	Fine saline, mineralized clay
Frasera pahutensis	Great Basin: Pinyon; Juniper; *Artemisia; Purshia*	May to July	2195-2410	Volcanic	Mountain slopes and valley bottoms	Gravelly
Galium hilendiae ssp. *kingstonense*	Great Basin *Pinus-Juniperus*	May-June	1680-1980	Volcanics	Ravines; gullies; usually on steep slopes	Loose and rocky
Glossopetalon clokeyi	*Artemisia*; pinyon-juniper	May-June	1219-1981	Calcareous	Cliffs	
Jamesia tetrapetala	Pinyon-juniper	May-June	1524+			

Table 3-8 (cont.). Habitat requirements for threatened, endangered, and candidate plant species, and SOC found on and near NAFR.

Species	Plant Community	Flowering Period	Elevation Range (m)	Parent Material	Landform	Soil Characteristics
Lewesia maguirei	Great Basin: Pinyon-juniper; *Artemisia*	June	2285-2380	Calcareous	Scree slopes	Loose denuded
Oryctes nevadensis	Great Basin Salt Desert Shrub: *Atriplex; Oryzopsis; Sarcobatus*	April-June	1190-1524		Hill slopes; foothills; dunes washes	Sandy
Penstemon arenarius	Great Basin: *Atriplex canescens; Sarcobatus; Oryzopsis; Tetradymia Psorothamnus*	May-June	1215-1340	Volcanic	Generally flats	Deep sandy; sometimes with pavement
Penstemon bicolor ssp. *roseus*	*Larrea*	May-June	610-1677		Washes	Gravelly
Penstemon fruticiformis ssp. *amargosae*	Mojave Desert: *Larrea-Ambrosia; Coleogyne; Atriplex confertifolia*	April-June	1005-1585		Washes	Sandy to gravelly
Penstemon pahutensis	Great Basin: Pinyon-juniper; *Artemisia*	June-July	1770-2285	Volcanic	Mesas	Loose rocky area; disturbed sites
Penstemon pudicus	Great Basin: Pinyon-juniper; *Cercocarpus; Artemisia*	June-July	2320-2805	Volcanic	Steep Mountain sideslopes; ridges; washes	
Phacelia beatleyae	Mojave Desert: *Larrea-ambrosia; Coleogyne*	April-May	1065-1770	Volcanic	Washes and canyons to loose talus; steep barren slopes	Gravel; talus
Phacelia parishii	Great Basin/Mojave Deserts	May-June		Variable	Playas; barren knolls	Alkaline
Porophyllum pygmaeum	*Atriplex confertifolia; Cologune*	April-May	914-1219	Calcareous	Concave drainages and adjacent slopes	Gravelly
Salvia dorrii var. *clokeyi*	Alpine meadows	May-July	1829-2743	Calcareous	Rock outcrops	Dry open sandy/gravelly
Salvia funerea	*Larrea; ambrosia; Atriplex; Echinocactus*	April-June	980-2290	Calcareous	Rock outcrops, cliffs, canyon slopes, washes	Shallow/gravelly
Sclerocactus blainei	*Artemisia; Atriplex; Sarcobatus; Chrysothamnus*	May-June	1067-1372	Calcareous or volcanic	Alluvial fans	
Sclerocacuts schlesseri	*Artemisia*	May-June	914	Calcareous; volcanic	Alluvial fans, plains	Sand with cryptobiotic crusts

Table 3-8 (cont.). Habitat requirements for threatened, endangered, and candidate plant species, and SOC found on and near NAFR.

Species	Plant Community	Flowering Period	Elevation Range (m)	Parent Material	Landform	Soil Characteristics
Selaginella utahensis	*Arctostaphylus; Quercus*		1524-2439	Sandstone	Cliffs; ledges	Crevices, shallow
Silene nachlingeriae	*Pinus-Juniperus*	August September	>1829	Calcareous	Rocky peaks; mountain slopes	Shallow
Smelowskia holmgrenii	*Holodiscus, Senecio canus, Erigeron Ribes, Leucopoa*	June August	1981-3353	Calcareous	Talus slopes; rock crevices; cliffs	Rocky, shallow, schist
Sphaeralcea caespitosa	Great Basin Salt Desert Shrub: *Atriplex confertifolia; Hilaria; Ephedra; Kochia*	May-June	1525-1980	Calcareous	Alluvial fans/plains	Usually gravelly, occasionally sandy
Townsendia jonesii var *tumulosa*	Great Basin: Pinus; *Juniperus; Cercocarpus; Artemisia nova*	June-August	1980-3050	Calcareous	Ridges; slopes; saddles; washes; open exposed sites	Loose sandy
Trifolium andinum var. *podocephalum*	*Artemisia; Cercocarpus;* Pinyon	May-July	1372-2256	Volcanic or Calcareous	Hilltops; ridges; bluffs	Dry, gravelly to rocky
Trifolium macilentum var *rollinsii*	Pinyon-juniper	May-July	2700-3000		Talus hillsides; flats; moist meadows	Gravelly-rocky clay

Numerous SOC may occur between the 1,300 m and 1,700 m (4,265 and 5,580 ft) contours, on soil derived from volcanic materials. Eastwood milkweed (*Asclepias eastwoodiana*) typically inhabits lower foothills and/or shallow gravelly drainages on alluvial landforms. Soils are usually shallow and alkaline. Gilman milkvetch (*Astragalus gilmanii*) typically inhabits canyon walls and hillsides with rocky to gravelly soil. Cane Spring evening primrose (*Camissonia megalantha*) typically grows on unstable loose substrates, including washes, talus slopes and disturbed areas. The soil is often sandy and alkaline. Welsh cat's-eye (*Cryptantha welshii*) is restricted to a distinct habitat type: erosional remnants of white tuffaceous material, located on alluvial fans and plains. Sanicle biscuitroot (*Cymopterus ripleyi* var. *saniculoides*) inhabits deep sandy soil on alluvial plains. Sunnyside elk weed (*Frasera gypsicola*) is restricted to lakebed sediments of fine saline mineralized clay. Kingston bedstraw (*Galium hilendiae* ssp. *kingstonense*) grows on steep slopes in ravines and gullies where pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) are abundant. Dune beardtongue (*Penstemon arenarius*) normally is found on alluvial flats or fans with deep sandy soil, in association with four-wing saltbush, Indian ricegrass, and horsebrush. Beatley scorpion weed (*Phacelia beatleyae*) grows in washes and canyons with loose talus and/or other types of coarse unstable slopes. Blaine pincushion (*Sclerocactus blainei*) and Schlesser pincushion (*Sclerocactus schlesseri*) both inhabit alluvial fan locations with sagebrush. Soils are typically sandy. Currant Summit clover (*Trifolium andinum podocephalum*) also grows within the elevation range of Emigrant Valley, typically inhabiting hilltops, ridges, and bluffs vegetated with sagebrush, mountain mahogany (*Cercocarpus ledifolius*), or pinyon pine.

From Sand Springs Valley through Southern Railroad Valley, the route is located between the 1,585 m and 1,890 m (5,200 and 6,200 ft) contours. The soils are derived from alluvial parent materials of volcanic origin. Two additional sensitive species may occur in this elevation range, on soil from volcanic parent materials. Pahute beardtongue (*Penstemon pahutensis*) prefers mesa locations with loose rocky substrates. Pahute beardtongue usually inhabits sites with high frequencies of natural disturbance. Beatley milkvetch (*Astragalus beatleyae*) also inhabits mesa locations, but is restricted to exposed masses of volcanic flatrock.

Sensitive species that may occur in Southern Railroad Valley are similar to those described for Emigrant Valley, therefore, a repetitive description of their habitat preferences is not presented here.

3.5.3. Wildlife

A wide variety of wildlife inhabits the project area, with some species occurring along the entire route and others restricted to specific segments. Common species found year-round throughout the entire length of the route include the kangaroo rat (*Dipodomys* spp.), deer mouse (*Peromyscus maniculatus*) and similar small mammals, badger (*Taxidea taxus*), black tailed jackrabbits (*Lepus californicus*), coyote (*Canis latrans*), kit fox (*Vulpus macrotis*), bobcat (*Lynx rufus*), horned larks (*Eremophila alpestris*), ravens (*Corvus corax*), rattlesnake (*Crotalys viridis lutosus*), gopher snake (*Pituophis melanoleacus*), and a variety of lizards. The redtail hawk

(*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*) and mountain lion (*Felis concolor*) are also probably present year-long at low densities, particularly in the more arid Mojave Desert region.

Big horn sheep (*Ovis canadensis*) are restricted to the Fallout Hills and Pintwater Ranges. During the summer, they likely concentrate their activities near springs. During winters with above-average precipitation, hence, widespread availability of ephemeral surface water and/or herbaceous forage with a high water content, the sheep probably move further from perennial water sources. Movement from the mountains onto the upper alluvial fans, where forage production is high probably occurs. Mule deer sign (old antlers) was found in the Fallout Hills, but not at any other location along the proposed route. Mule deer, most likely, are restricted to the mountainous regions, and have a low density because perennial water sources are poorly distributed. Pronghorn antelope (*Antilocapra americana*) are present from the south end of Emigrant Valley, north through Southern Railroad Valley. Pronghorn are probably present and mule deer absent, because pronghorn are physiologically adapted to range much further from water sources than deer. Also, pronghorn prefer the open habitat structure in valley locations. Mule deer prefer habitats with good hiding cover, which is not present in the open valley bottoms.

3.5.4 Sensitive Fauna

The desert tortoise (*Gopherus agassizii*), peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*) are listed as threatened or endangered, and may occur along a part or all of the proposed route. The desert tortoise prefers areas where creosotebush is the dominant shrub (Luckenbach, 1982; USFWS, 1990), but also may have a low abundance in blackbrush communities. Both the peregrine falcon and the bald eagle are infrequent seasonal migrants on the NAFR. They prefer riparian habitats where prey bases are larger, and roosting habitat is present. The remaining threatened and endangered species in southern Nevada, except for the Ash Meadows naucorid bug (*Ambrysus amargosus*), are restricted to aquatic or riparian habitats, which are absent from along the proposed route. The Ash Meadows naucorid bug is only found in the vicinity of Ash Meadows, which is over 30 km (19 mi) west of the proposed route.

Candidate species for listing as threatened or endangered, whose known distribution may include the proposed route are the mountain plover (*Charadrius montanus*) and the Great Basin population of the spotted frog (*Rana pretiosa*). The mountain plover is a seasonal migrant that winters in the far west and southwest, and summers in the high plains and semi-desert regions of Colorado, Wyoming, and Montana. The spotted frog requires riparian habitat.

Species of concern whose known distribution includes Northern Mojave and/or Southern Great Basin habitats include: pygmy rabbit (*Brachylagus idaoensis*); spotted bat (*Euderma maculatum*); small-footed myotis (*Myotis ciliolabrum*); long-eared myotis (*Myotis evotis*); fringed myotis (*Myotis thysanodes*); cave myotis (*Myotis velifer*); long-legged myotis (*Myotis volans*); Yuma myotis (*Myotis yumanensis*); western big-eared bat (*Plecotus townsendii*

townsendii); Allen's big-eared bat (*Idionycteris phyllotis*); northern goshawk (*Accipiter gentilis*); burrowing owl (*Athene cunicularia*); ferruginous hawk (*Buteo regalis*); banded gila monster (*Heloderma suspectum cinctum*); and chuckwalla (*Sauomalus obesus*). The least bittern (*Ixobrychus exilis hesperis*) and the black tern (*Chilidonias niger*) are associated with riparian habitats and may be infrequent migrants through the area.

The pygmy rabbit prefers tall sagebrush habitat, and has only been found at more northerly locations. The bat species roost in caves, mines, buildings, rock crevices, and/or hollow trees. Foraging sites are generally related to water sources because insect populations are much larger. Activity between these critical foci is probably limited to travel to and from feeding stations and roosts. The northern goshawk and ferruginous hawk are seasonal migrants that infrequently traverse through the project area. The goshawk prefers mountainous locations with riparian habitat, while the ferruginous hawk prefers Juniper savannas, with trees that are widely scattered. Black sagebrush is often the primary understory shrub. The burrowing owl uses burrows of other species and prefers locations with low shrub cover. The banded gila monster is restricted to Mojave Desert shrub communities in the southernmost part of Nevada. The NAFR is near the northernmost limit of its distribution. The Chuckwalla is also limited to Mojave Desert locations, where it is generally restricted to rocky hillsides and rock outcrops.

Throughout southern Nevada there are many vertebrate and invertebrate SOC that are restricted to aquatic habitats (Appendix 1). Many terrestrial invertebrates are also SOC (Appendix 1). These animals are generally restricted to specific geographic locations (e.g., mountain ranges, valleys, sand dunes), and none are known to occur in or near the project area.

3.5.5 Livestock Grazing

On the NAFR, livestock grazing is only allowed in the Bald Mountain Allotment, which is located on the eastern flank of the Groom Range, many kilometers from the proposed route. Livestock grazing is not permitted on that portion of the DNWR that overlaps with the NAFR.

3.6 Visual Resources

For portions of the NAFR withdrawn from public land there are established visual resource management (VRM) classes and guidelines (BLM, 1986; USDI, 1990). Similar guidelines for the DNWR are not known to exist; however, guidelines developed for land managed by the BLM can be applied in order to conduct an analysis of impacts to visual resources on the DNWR.

For locations in Indian Springs Valley south of the Fallout Hills, the visual resource has been modified by previous Air Force activities. The valley bottom has been an active bombing range for many years. Numerous targets, including fixed and mobile units are present, and they often cover hundreds to thousands of hectares. Much of the vegetation near targets on non-playa locations has been severely altered due to repeated bombing and other surface disturbing

activities. The proposed route follows the center of, or is immediately adjacent to the road that passes through these targets and disturbed areas.

The Fallout Hills are largely undisturbed except where the road bisects them. There is little other evidence of human activity. The proposed route follows the center of the road throughout this section.

In Emigrant Valley, between the base of the Fallout Hills and the northern boundary of the DNWR, the visual resource is one of a broad flat valley bounded by relatively short mountains. There is little evidence of human activity, except for the Indian Springs/Emigrant Valley Road and several similar dirt roads that cross the valley. None of these roads are readily seen, except when an observer is in their immediate vicinity (about 1-30 m (3-100 ft)) or high above them. Throughout this section the proposed route would be on the road, in an existing 17.6 m (58 ft) wide right-of-way (i.e. from the centerline of the road).

From north of the boundary of the DNWR to the northwest edge of Groom Lake, the route would continue on the road. From here, the route follows an existing utility line corridor to the Cedar Pass Gate. Visual resources on land administered by the Air Force are managed according to guidelines described in the Nellis Air Force Range Resource Plan (USDI, 1990). The entire area of the proposed route north of the DNWR area is designated as a VRM Interim Class IV, which provides for management activities that may result in major modification to the existing character of the landscape (BLM, 1986).

The route is mostly located on valley bottoms (Emigrant Valley, and Southern Railroad Valley), that are bounded by low to high mountains on the east, north, and west. Shallow saddles are present on the north end of each valley. Visibility is excellent, with the vegetation and landscape largely undisturbed by human activities. Past and current human activity in Emigrant Valley and Southern Railroad Valley include one paved road in each valley, a few widely scattered dirt roads, very widely scattered Air Force buildings and/or targets, and several above-ground powerlines. Development in Sand Springs Valley is limited to one abandoned target that was bladed into the soil, and two dirt roads that are perpendicular to one-another. Anthropogenic surface features are often not visible unless the observer is in their immediate vicinity, or high above them.

3.7 Land Use

3.7.1 Existing Facilities

Infrastructure to support the Air Force's training, testing and evaluation programs is scattered across both the North and South Ranges, and consists of various support buildings, roads, communications facilities, and water supply and wastewater treatment/disposal systems. None of this infrastructure would be affected by the proposed FOL route, other than as end points for the route.

3.7.2 Mineral Resources

The proposed FOL route does not go through any mining districts, nor would the FOL route affect any mineral resources.

3.7.3. Wilderness

Proposed wilderness areas are present on the DNWR where it overlaps with the NAFR (Figure 2). The Spotted Range and Desert-Pintwater units are separated by the Indian Springs to Emigrant Valley road (USFWS, 1971). A right-of-way (8.5 m (28 ft)) on each side of the road's center line exists, so that road maintenance would not intrude into the proposed wilderness areas.

3.8 Recreation Resources

The entire NAFR, including the area that overlaps the DNWR is closed to all public access, with one exception. For a 14 consecutive day period each fall, hunting for bighorn sheep is permitted at two locations: range 4806W, which is bisected by the route, and Stonewall Mountain, which is over 75 km (47 mi) west of the route. Access is restricted to hunting parties with tags valid for these two locations. The general public is not allowed access at any time. No other public recreational activities are permitted on the NAFR.

3.9 Cultural and Historical Resources

The proposed FOL route is in the southern Great Basin, which has been occupied by humans for at least 11,500 years. Archaeologists and paleoenvironmentalists have proposed that several important environmental and cultural changes may have occurred during this time (see Pippin, 1995; 1997a). From about 11,500 to 8,000 B.P. relatively wetter and cooler conditions than today prevailed, and the prehistoric occupants of the region apparently followed a generalized hunting adaptation involving low population densities and highly mobile groups (Spaulding, 1985; 1990; Spaulding and Graumlich, 1986). Between about 8,000 to 4,000 B.P., the climate is thought to have become warmer than today and this period was marked by several contracting periods of both increased precipitation and drought (Graybill et al., 1994, LaMarche, 1973, Fig. 4). Human subsistence during this period apparently focused on a more diverse use of resources with plant food becoming more important through time. Some researchers have suggested that environmental conditions were so adverse during this period that certain areas of the Great Basin may have been abandoned entirely (Donnan, 1964; Kowta, 1969; Susia, 1964:31); Tuohy, 1974:100-101; Wallace, 1962; Warren 1980:35-44), but this is probably not true of the area encompassing the FOL route. A milder and wetter environment is envisioned from about 4,000 to 1,500 years ago and there appears to have been an increase in the number and complexity of archaeological sites. Adaptations during this time are characterized by Lyneis (1982;177) to entail large semi-sedentary communities on valley floors with broad-scale use of the surrounding landscape, including highland areas. The bow and arrow was introduced around 1,500 years ago and prehistoric occupations became marked by an increase number of small,

temporary camps scattered throughout the landscape. Some researchers have proposed that the Paiute and Shoshone peoples, who occupy the area today, first entered this region only about 700 years ago (Bettinger and Baumhoff, 1983; Fowler, 1972; Fowler and Madsen, 1986:181-182; Lamb, 1958; Madsen, 1975; Warren and Crabtree, 1986:191-192; Young and Bettinger, 1992), but others suggest a continuous occupation by indigenous people (Aikens, 1994; Aikens and Witherspoon, 1986; Goss, 1977).

Euroamerican fur traders and explorers first entered what is now Nevada in the late 1820s (Hardesty, 1986:13; Morgan, 1953), but it wasn't until after 1845, when the Mormon Road was developed through Las Vegas from Salt Lake City to San Bernardino, that these new people began to infiltrate the southern portion of the state (McLane, 1993:12; Hafen and Hafen, 1954). The famous Death Valley party passed through portions of the project area in the winter of 1849 and Fremont's fifth and final expedition passed through Sand Springs Valley, southern Railroad Valley and the Kawich Range in 1954 (Spence, 1984:480-489). Nevada became a Territory on March 2, 1861 and finally gained statehood on October 31, 1864 (Hulse, 1991). In an election, held only a week after Nevada became a state, Henry B. Blasdel, a Virginia City mine and mill superintendent, became its first governor.

After the discovery of gold at the Comstock Lode in 1859, the quest for *el dorado* was on with prospectors, miners, promoters and the like meandering all through the Great Basin searching for gold or silver ore, or for those who found it (Hulse, 1991). It was first found at places like Aurora and Unionville in the north, however, in 1861 it was also found in Eldorado Canyon on the Colorado River south of Las Vegas, and then the following year at Austin in central Nevada. These two discoveries initiated a north-south route of travel that apparently coincides with the proposed FOL route through Indian Springs Valley and across Hungry Hill Summit (Lewis, 1977:62; Pippin and McLane, 1994; Todd, 1865). By 1865 several mining camps (Pahranagat, Tem Piute, Union and Belmont) had been established along this route of travel (Rood 1866; Tingley, Horton and Lincoln, 1993:14). Reports of ore discoveries in the Pahranagat district perked the interests of both Governor Blasdel and Utah's territorial governor and competition between Nevada and the Territory of Utah for jurisdiction over this area prompted the creation of Lincoln County and led to the shift in the eastern boundary of Nevada to its current location along the 114° meridian in 1866 (Hulse, 1991:89-90). Work at the Groom and Southeastern (Arrowhead) mines was initiated in 1870. By the late 1890s the boom was over as silver was demonetized and the bottom fell out of the market.

Things changed drastically with the discovery of gold at Tonopah in 1890, then at Goldfield in 1902, and again at Bullfrog (Rhyolite) in 1904 (Ball, 1907; Kral, 1951:28-46, 72-75, 169-174). Prospectors and miners began arriving by the droves and prospecting and mining camps sprang up all through the region traversed by both the alternative and preferred routes of the FOL. By 1908 mining camps had been established at such places as Gold Crater, O'Briens Camp (Wellington), Wilsons Camp, Trappmans Camp, Antelope Springs (Sulphide), Blakes Camp, Cactus Spring, Golden Arrow, Gold Reed, Jamestown, Wheaton, Monte Cristo Springs, Quartz Mountain, and Eden (Ball, 1907; Tingley, Horton and Lincoln, 1993:11-24). Several railroads also found their way to the region with the Tonopah and Goldfield Railroad (Bullfrog

Goldfield) connecting Tonopah and Goldfield with the Carson and Colorado Railroad (Southern Pacific System) by 1905, the Las Vegas and Tonopah Railroad connecting Goldfield with the Los Angeles and Salt Lake Railroad (Union Pacific System) in 1907, and the Tonopah and Tidewater Railroad, built from Ludlow on the Sante Fe line also connecting to Rhyolite and Goldfield in 1907. This portion of the west was finally opened.

An existing data review was conducted in May 1996 in order to determine the cultural resource sensitivity of the proposed undertaking [Pippin (DRI SR050496-1), 1997b]. Because the Area of Potential Effect was defined as the width of surface disturbance, which is all within existing roads, no new surface disturbance would occur. Thus, no cultural resources are present within the Area of Potential Effect.

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4.0 ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION

4.1 Climate and Air Quality

The proposed FOL route would not affect the climate in the area. The potential air quality impacts from the any construction along the proposed route would be limited to dust generated during construction, minor vehicular exhausts from construction equipment and dust from newly re-disturbed land surface.

The potential amount of land re-disturbed by construction of a FOL in the proposed route would be only approximately 49.8 ha (123 acres).

Under regulations of the Nevada Division of Environmental Protection, most new sources of air emissions require a Permit to Construct and a Permit to Operate with some exceptions. NAC 444.705 lists exceptions to Nevada air quality permit process, among which is the land disturbance of less than 2 hectares (5 acres).

From the above, the amount of land disturbance that might occur along the proposed route would require an air quality permit. Any construction activity and resultant particulate loading potential would be reported under the Nellis AFB general air quality permit for NAFR. The amount of construction-generated fugitive dust would be small due to the nature of that activity. The emissions would be related to construction of the FOL trench and vehicular support of that activity. No long-term significant air quality deterioration is expected.

4.2 Physiography, Geology and Visual Resources

4.2.1 Impacts to Physiography and Geology

Neither the proposed FOL route, nor any of the alternative actions, would significantly alter the local topography or have any impact on the geology or geologic resources. Since the land involved has been withdrawn from mineral exploration, no adverse effect on the availability of mineral resources would be anticipated. No action has been proposed that would preclude the possible future extraction of minerals from the land should it eventually be returned to public use.

4.2.2 Visual Resources

Proposed Action

Any construction along the proposed route would result in minor modification to visual resources, but the impact would not be significant. From the northern boundary of the DNWR, northward to the Cedar Pass access gate, the interim visual resource management category is category IV (USDI 1990). This classification permits major modification of the landscape's character. Other locations on the DNWR that the route traverses are not subject to visual

resource management categories and guidelines. The following provides additional rational for determining that significant adverse effects should not occur.

For 8 km (5 mi) north of the Indian Springs AFAF, the route is adjacent to the road and the affected landscape is a large mostly barren (except for anthropogenic features) playa. Emplacement of the FOL in this landscape feature should not create a new visual pattern on the landscape. In the remainder of Indian Springs Valley and in the Fallout Hills, the FOL route would be placed in the center of the road, resulting in no additional effect to visual resources.

Between the northern base of Fallout Hills and Groom Lake, the visual aspect should change little. The road is wider than the FOL route and is permanently bare; therefore, it should remain the dominant visual landscape feature.

From Groom Lake north to Sand Springs Valley the route overlaps with a variety of existing disturbances. There are also a number of other disturbances throughout the area that overshadow the FOL route, and remain the visual dominants.

From the southern edge of Sand Springs Valley through the southern end of the Quinn Canyon Range, and the north end of the Belted Range the route is still superimposed on an existing disturbance, however, the landscape as a whole has an undisturbed appearance. One infrequently used dirt road would be crossed in Sand Springs Valley, where there is also an abandoned dirt target that was originally created by scraping away the vegetation. Secondary succession is occurring on the target, however, it remains quite visible from a distance, but only when an observer is located at a higher elevation. Similarly, an observer would probably only see the FOL route when located near or above it. The limited visibility of the route corridor from Sand Springs Valley to Southern Railroad Valley, combined with infrequent human use of the area eliminates potential adverse impacts to the visual resource.

In Southern Railroad Valley, the route is superimposed upon a utility line corridor, and is within 30 m (100 ft) of an existing dirt road, an above-ground powerline, and/or a barbed wire fence (NAFR boundary fence). The size of the existing road and powerline overshadow the width of the FOL route, making them the dominant anthropogenic features regardless of the routes presence or absence.

No Action Alternative

The no action alternative would have no impacts to visual resources.

Alternative Data Transmittal Technologies

This alternative has effects similar to the no action alternative because no new surface disturbances would occur, and should not be significantly different than the proposed action.

Alternative Route

An alternative route along Highway 95, the Tolicha Peak access road, and along existing roads on the northern ranges of the NAFR should have impacts similar to the proposed action. Surface areas would be disturbed, but they largely reside in existing rights-of-way, where previous disturbance has occurred. The influence of existing disturbances should overshadow any disturbance related to the FOL.

4.3 Hydrology and Water Resources

4.3.1 Erosion

The FOL route from Indian Springs AFAF to Cedar Pass would cross many ephemeral stream channels. Most of the route is well down gradient of the mountain fronts and the topographic relief is relatively slight; therefore, the erosion potential is slight. A review of the route indicated that there is only one location with high concern for erosion and deposition. This location is the "canyon area" between Indian Springs Valley and Hungry Hill Summit. The concerns are: 1) the emplacement and backfilling of the trench through this canyon may create a preferential flow path that could result in long term erosion and gullying; and 2) a single flow event could uncover and destroy the fiber optic line. The data in Table 3-5 suggest that if the fiber optic cable is at least 1 m (3 ft) deep it would not be uncovered by flow events having peak flows of 70 m^3/s (2,500 ft^3/s) or less.

4.3.2 Water Resources

Neither the proposed FOL route nor any of the alternative actions, would have an impact on water resources. Any trench excavated along the proposed route would be only about a meter deep (3 ft) which would not impact groundwater resources, or any of the springs in the valleys. Because the FOL route is in an ephemeral channel at the north end of Indian Springs Valley, there is some potential for increased erosion in the channel. This potential is expected to be small due to the limited occurrence of rain storms in the area.

4.4 Vegetation

Proposed Action

The direct effect of any construction along the proposed route would be the removal of all vegetation by re-disturbance of an area of 41.2 ha. The direct ecological impact at the local scale (i.e. area directly affected) would be intense and adverse. At regional and higher scales the effect should not be significant.

Because the spatial configuration is a narrow linear corridor the ecological effect is different than if the area disturbed were a large central block (e.g., square, circle, etc.). For example, wind erosion (due to decreased surface roughness) is not likely to increase because the

disturbance's fetch area would be limited to a 3-4 m width. Water erosion is unlikely because the terrain is generally flat.

One immediate effect would be an increase in undesired annual weeds. Observation on similar disturbances across the region indicate the abundance and composition of weeds would vary with geographic and topographic location. Red brome is the dominant weed on Mojave Desert locations with sandy to clay loam soil, and Halogeton on silty soil. Great Basin locations should have increases in cheatgrass, Russian thistle, and/or halogeton, with cheatgrass and Russian thistle being more abundant on soil with high clay content, and Halogeton on soil with high silt and alkali content. There are at least three adverse ecological effects that may arise from increased weed abundances. First, the rate of secondary succession by desired perennial species (particularly grasses) may decline. Second, fewer perennial grasses should decrease the absolute availability of forage, but probably not its functional availability. The functional availability should not decline because poor water distribution, not the quantity of forage, limits most (if not all) animal populations in the project area. Third, increased annual weeds increase the potential for wildfire (Billings, 1994).

Perennial species would slowly become established on the route, with grasses (particularly Indian ricegrass) increasing first. Many disturbed sites (e.g., borrow areas and buried utility lines) in Emigrant Valley have excellent stands of Indian ricegrass despite the presence of cheatgrass (Schultz, personal observation). The absence of repeated disturbance at short intervals, and livestock grazing during the growing season, probably permit the rapid re-establishment of perennial grasses. In Southern Railroad Valley, succession by grasses would probably be much slower because feral horses graze the area year-long. Shrubs with high relative abundance on disturbed sites in Emigrant, Sand Springs, and Southern Railroad Valleys include four-wing saltbush, Nevada Mormon tea, shadscale, winterfat, and rabbitbrush. Because the disturbed area is a narrow corridor rather than a large block, the seed necessary to initiate secondary succession is quickly dispersed onto the disturbed area. Safe sites (Harper et al, 1965) for seed germination and seedling survival are likely to be occupied relatively quickly.

The establishment of highly flammable annual weeds can increase the frequency of wildfires. The potential increase in fire frequency is probably a function of the size and configuration of the area infested with weeds. Large contiguous blocks with a high weed abundance probably have a higher probability of ignition from lightning and/or other sources. Also, once a fire is ignited it probably would spread quicker in a large area infested with annual weeds, than in a spatially small infestation. Sites with relatively few annuals usually have a fuel load dominated by heavier (larger) fuels, that normally have higher moisture levels. This results in fires that spread slower, unless extreme burning conditions (i.e. strong dry winds) are present. This project should result in a very slight, but nonsignificant increase in fire potential. The impact is judged nonsignificant because the increase for ignition potential is limited to a very small total area that is spread across an entire region. Also, infrequently disturbed sites near the FOL route appear to have a large component of perennial species, during secondary succession (Brad Schultz, personal observation). Since this project is a one-time disturbance

similar to others on the NAFR it is logical to assume that perennial species should be a major component of secondary succession.

No Action Alternative

This alternative would have no significant impacts, because there would be no human caused changes to the vegetation resource.

Alternative Data Transmittal Technologies

This alternative would have no significant impacts, because there would be no human caused changes to the vegetation resource. Existing infrastructure can be used.

Alternative Route

Use of an alternative route along Highway 95, the Tolicha Peak access road, and along existing roads on the NAFR are similar to the proposed action, and should not be significant. Construction would occur in previously disturbed rights-of-way.

4.5 Threatened and Endangered Plant Species

Proposed Action

The proposed action should not adversely effect sensitive species. No species listed as threatened or endangered, or proposed for listing as threatened or endangered are known to occur in or near the route, or in the habitat types in or near the route.

None of the SOC that may occur near the route should be adversely affected. In most of Indian Springs Valley and the Fallout Hills the route would be located in the center of the road, effectively eliminating potential adverse effects to SOC, including the population of Parish phacelia bisected by the road. The Parish phacelia should not be affected because the FOL route would be in the center of the existing road, and Parish Phacelia is located outside the confines of the road. This population of up to 30 million plants (Knight et al. 1997) has survived over 50 years of Air Force bombing and targeting practice, therefore, it is not reasonable to expect that burial of the FOL in the road should have an adverse effect. Annual species by nature are adapted to disturbance and harsh environments (e.g, barren and infrequently flooded playas).

Most SOC that may occur from Emigrant Valley northward, typically grow in unique habitat conditions (see Chapter 3) that are not present in the FOL route. Exceptions include dune beardtongue, Blaine and Schlesser pincushion, Eastwood's milkweed, and sanicle biscuitroot. Dune beardtongue and the two pincushions are perennial species that should have been observed during the biological survey, if they were present in the proposed route. Abundant precipitation the previous winter permitted ample growth of all perennial species, and the above-ground growth of dune beardtongue and the pincushions does not decompose rapidly.

Since no plants were observed, no adverse effects should occur. Eastwood's milkweed is also a perennial species, but its above-ground growth can desiccate and decompose rapidly in mid-summer. Ancillary evidence, however, suggests adverse impacts to Eastwood's milkweed should not occur. Abundant above-ground growth was observed at known populations on July 8-10, 1997 (Brad Schultz, personal observation). Many plants had not yet begun to desiccate. If Eastwood's milkweed were present in the FOL route it seems unlikely that the above-ground portion of all of the plants potentially present would have completely desiccated and decomposed completely in the two-week period between early and late July. Since Eastwood's milkweed was not found in the biological survey it probably is absent from the FOL route, and no populations should be adversely affected. Sanicle biscuitroot populations occur in southern Emigrant Valley (Knight et al., 1997), but no known populations exist in the proposed FOL route. No new populations were found during the biological survey, but above-ground growth of this species decomposes early in the summer (June-July). This reduces the strength of conclusions drawn from surveys conducted in late July. Several factors, however, strongly suggest this species (not just unknown populations) should not be adversely affected. First, the route does not intersect any known populations, and there are numerous populations across the NTS and southern ranges of the NAFR (Knight et al., 1997) that will not be affected. Second, the narrow width of the FOL route is unlikely to affect an entire unknown population, even if it were bisected. Most populations occupy a spatial area much broader than the 2-4 m (6-12 ft) width of the area disturbed during excavation and burial of a FOL. Third, relatively dense brush cover from Emigrant Valley to the Cedar Pass gate probably reduces the potential occurrence of sanicle biscuitroot. Most observations indicate sanicle biscuitroot inhabits areas with low shrub cover (Barneby, 1941; Knight et al., 1997), probably because it is a poor competitor with large shrubs. Fourth, there is substantial speculation about the taxonomical validity of this species (Kartesz, 1987; Knight et al., 1997). Very few taxonomists recognize it as a separate species.

No Action Alternative

The no-action alternative would not disturb any potential habitat, however, its ecological effects are not significantly different than the proposed action, because the proposed action would not have any adverse effects.

Alternative Data Transmittal Technologies

Ecological impacts from this alternative are identical to the no action alternative, and not significantly different than the proposed action.

Alternative Route

Potential impacts are similar to the proposed action. The alternate route along Highway 95, the Tolicha Peak access road, and existing roads on the northern ranges crosses the same potential habitat (but in different locations) as the proposed action. Since the alternative route occurs largely in rights-of-way that have already been disturbed the potential for adverse impacts to SOC is very low.

4.6 Wildlife

4.6.1 General

No species should be directly or indirectly affected by this project because their home range and/or territories are many times larger than the area potentially impacted. Also, no critical habitat elements (water supplies, forage area, breeding grounds, etc.) are affected.

Proposed Action

Adverse effects are possible to individual animals, with burrowing rodents being those most likely affected. Small mammals generally seek safety in their burrows, and during excavation for burial of the FOL some are likely to be buried alive. Because the route corridor affects a small absolute area that is spread over a large region the loss of some small mammals should not adversely affect the prey base, or the positive functions rodents serve for seed dispersal and burial. Individual breeding birds and their young may be adversely affected, but only if construction along the route occurs in the spring and early summer months (March-July). Eggs and recently hatched young would not be able to escape the heavy equipment, as can adults. During the remainder of the year all avian species could readily fly from and avoid any construction activity. The loss of forage (seed or leaf) should not affect any species or individual because they must acquire this resource from an area much larger than the area disturbed. For the larger herbivorous species, water distribution, not forage is the habitat element that probably controls population size. For smaller herbivores, population size is controlled by interactions among annual precipitation (i.e., control of forage base), predation, and to some extent the spatial and temporal distribution of water sources.

One potential indirect effect is a decline in habitat quality if the route facilitates the dispersal of annual weeds into adjacent undisturbed locations. This situation was discussed above (see vegetation) and is believed to be unlikely.

No Action Alternative

The no action alternative would have the same ecological effects at the species and higher ecological levels, as the proposed action. At the ecological level of the individual, the no action alternative would have no adverse impacts, while the proposed action probably would kill some small mammals, and has the potential to harm some birds. Wildlife management, however, is concerned with faunal populations. No local or regional population of any species should be adversely affected by either the no action or proposed action.

Alternative Data Transmittal Technologies

Potential impacts are similar to the no action alternative.

Alternative Route

Use of the alternative route along Highway. 95, the Tolicha Peak access road, and existing roads on the north ranges (of the NAFR) should have potential effects similar to the proposed action. The same species occupy the alternative route, and the same spatial and temporal controls for the presence, absence, and abundance of all species are present. The ecological effect of using the alternative route should not be significantly different than any of the alternative actions.

4.6.2 Sensitive Species

Proposed Action

In Indian Springs Valley and the Fallout Hills, the route would be located within the Emigrant Valley/Indian Springs Road, except for the 8 km segment immediately north of the Indian Springs AFAF. This 8 km segment is located in a largely non-vegetated playa that is not suitable habitat for desert tortoises. The soil is extremely silty, which makes digging burrows difficult, and it periodically floods during wet winters. Flooding may drown hibernating tortoises. Also, the herbaceous plants that provide the bulk of a tortoise's diet are absent, and the entire area is frequently used for air-to-ground target practice. Also, this segment has been subject to periodic disturbance by Air Force bombing, gunnery, and target practice.

Eight km (5 mi) north of the Indian Springs AFAF, the route is moved from adjacent to the road to the center of the road, and would remain there until it reaches the southern end of Emigrant Valley. Between the 8 km (5 mi) mark and the 1,097 m (3,600 ft) contour, tortoises are not expected to occur, for several reasons. First, much of the route remains in the playa. Second, this entire area is an active bombing range, and several craters on or adjacent to the road indicate ordnance periodically fall on or near the route. Third, the high level of ground disturbance and shaking probably eliminates or strongly reduces tortoise activity. Finally, if tortoises do use habitat adjacent to the road they should not be adversely affected because the route and all construction would remain within the confines of the road.

Between the 1,097 m (3,600 ft) elevation contour and the southern base of the Fallout Hills, ground disturbing activities by the Air Force are absent. The lack of human activity and the presence of a Creosote bush/Bursage/Joshua tree plant community, with a herbaceous understory, suggest that good quality habitat for tortoises is present. A complete visual search of this segment did not find any tortoises, tortoise burrows, or tortoise scat in the right-of-way of the road. Since the FOL route would be located in the center of the road no adverse effects to tortoises are expected.

In the Fallout Hills there should be no adverse effects to desert tortoises, because the route remains in the center of the road. Much of this segment also passes through a narrow canyon with steep hillsides that generally rise immediately from the shoulders of the road. The slope often exceeds 50 percent, the soil is shallow to bedrock (0 to 40 cm (0 to 13 in)), and often

has insufficient structure to support the establishment of burrows. Blackbrush and sagebrush plant communities are common throughout this segment, and neither plant community provides good habitat for tortoises (EG&G, 1991). Much of this area is also above the 1,219-1,524 m (4,000 - 5,000 ft) elevation contours, which are strongly linked with the northern distribution of the desert tortoise on the adjacent NTS (EG&G, 1991).

Tortoises have not been found on the NTS north of a line that connects Massachusetts Mountain with CP Hills (EG&G, 1991). Hungry Hill Summit (in the Fallout Hills) is north of this line, and has a slightly higher elevation than Massachusetts Mountain or CP Hills. The climate in the Fallout Hills and areas further north (Emigrant Valley) is not warmer, and probably is cooler than in Yucca Flat, on the NTS; therefore, tortoises should not occur north of Hungry Hill Summit.

Both the peregrine falcon and bald eagle are transient migrants that do not regularly use any of the habitat in the FOL route. Also, none of the candidate fauna should be adversely affected. The mountain plover is an infrequent seasonal migrant that does not require any habitat type found in the FOL route. The spotted frog should not be present because the riparian/aquatic habitat required by this species is absent from the route and the immediate vicinity.

None of the SOC potentially present should be adversely affected. The pygmy rabbit has only been found at more northerly locations, and the northern end of the route barely enters the potential range of this species. Roost and foraging locations required by the bat species are not located on or near the route, therefore, critical habitat features are not affected. The northern goshawk, least bittern, and black tern should not be affected because they are infrequent seasonal migrants that are strongly associated with riparian habitats, which are absent from the project area.

None of the invertebrate SOC (see Appendix A) should be adversely affected by this project. None are known to occur in the vicinity of the FOL route. Also, most appear to be geographically restricted , which probably results in strong links to specific habitat types or habitat structure. There are no unique plant communities, landforms, or other features in or near the route that would suggest sensitive invertebrates may be present.

No Action Alternative

This alternative would have no effects to any species or individual. Since the proposed action should not have any adverse effects, the ecological effect of the no action alternative is not significantly different than from the proposed action.

Alternative Data Transmittal Technologies

This alternative should have the same effects as the no action alternative.

Alternative Route

Use of the alternative route along Highway. 95, the Tolicha Peak access road, and existing roads on the NAFR should have impacts similar to the proposed action. The same plant communities and habitat types are encountered, thus the same sensitive species are potentially present. Because this alternative would use existing rights-of-way that are largely disturbed no adverse ecological effects to sensitive fauna should occur.

4.7 Livestock Grazing

Proposed Action

Livestock grazing would not be adversely affected by the proposed FOL route because the entire NAFR, except for the Bald Mountain Allotment, is closed to livestock grazing, and the proposed route does not enter the Bald Mountain Allotment.

No Action Alternative

Potential impacts are identical to the proposed route.

Alternative Data Transmittal Technologies

Potential impacts would be identical to the proposed route.

Alternative Route

An alternative route along Highway 95 should not adversely affect livestock grazing. This alternative would be located in the existing right-of-way which is generally fenced to exclude livestock. For any unfenced portion, the FOL would be buried in the disturbed shoulder of the highway. Also, the narrow width of the route, despite its long length, results in a relatively small amount of land disturbance and little loss of forage, within any geographic (e.g., valley) or administrative land unit (e.g., grazing allotment). Most of the alternative route also traverses a creosotebush community, which is classified as ephemeral rangeland. Forage production is generally low except in years with wet winters. After wet winters, the standing crop of annual plants is so large that permitted livestock never consume all of the available forage. The loss of forage from a relatively small area would not be noticed following a wet winter.

4.8 Land use

Proposed Action

The proposed action should not adversely affect wilderness values for several reasons. First, the FOL route would not occur on any land area designated as wilderness or proposed

wilderness. Second, placement of the FOL route in the center of the road in the Fallout Hills would not alter existing views from the proposed wilderness areas on both sides of the road. Third, in southern Emigrant Valley the proposed wilderness areas begin 17.6 m (58 ft) from the road's centerline, but the FOL route would be located inside the 17.6 m right-of-way. The view from the proposed wilderness areas should not be adversely affected because the existing road, which is wider than the proposed FOL route, and which would not undergo secondary succession, would remain the dominant anthropogenic feature. Fourth, the remainder of Emigrant Valley has limited wilderness values due to scattered but widespread (i.e., low density) human developments. Superimposing the FOL route on one linear disturbance that is located among several other disturbances should not decrease the remaining wilderness aspect. Fifth, a narrow linear corridor across the low pass from Sand Springs Valley to Southern Railroad Valley and its adjacent mountain ranges would be difficult to see unless the observer is directly on or above the route. This should not adversely affect the low pass area's relatively undisturbed aspect. Also, low level aircraft missions are common and these probably have the largest effect on wilderness values. Sixth, the route is adjacent to existing roads and/or powerlines in Southern Railroad Valley, and the size of the existing infrastructure is substantially larger than the FOL route. Seventh, operation of the FOL would generate no anthropogenic noise, which is one of the most severe impacts to a "wilderness environment".

No Action Alternative

Impacts to proposed wilderness areas are identical to the proposed route, because no wilderness areas or proposed wilderness areas would be adversely affected.

Alternative Data Transmittal Technologies

Impacts to proposed wilderness areas would be identical to the proposed route, because no wilderness areas would be adversely affected.

Alternative Route

Impacts to proposed wilderness areas would be identical to the proposed route, because no alternative route would pass in or near a wilderness or proposed wilderness area.

4.9 Recreation

Proposed Action

Recreational opportunities would not be adversely affected by development and operation of this project, for two reasons. First, hunting is the only public recreational pursuit allowed on the NAFR, and the existing (regulated) policy for hunter access would not be changed. Second, hunting opportunities could only be adversely affected if direct or indirect changes in habitat quality occur, and if these changes adversely affect game populations. Development and operation of the FOL route would not alter habitat in areas of Range 4806W

because the FOL route is superimposed on top of existing disturbances. The remainder of the NAFR that is intersected by the FOL route would continue to be closed to recreational opportunities.

No Action Alternative

This alternative has the same impacts as the proposed route.

Alternative Data Transmittal Technologies

This alternative has the same impacts as the proposed route because existing communication systems would be used. No new facilities would be constructed in areas used by hunters.

Alternative Route

This alternative would have the same effects as the proposed route. The alternative route along Highway 95 follows existing transportation routes, and the alternative FOL route would be placed in rights-of-way where recreational opportunities are absent. On the NAFR, alternative routes are in locations not open to hunting or other recreation, therefore no opportunities would be lost.

4.10 Cultural Resources

Proposed Action

Section 106 of the *National Historic Preservation Act of 1966* requires that Federal agencies take into account the effects of their undertakings on historic properties. Efforts to identify and evaluate cultural resource properties for the following projects according to 36 CFR 800.4 are described in a Nellis AFB Cultural Resource Management Report [Pippin (DRI SR050496-1), 1977b]. The *Archaeological Resources Protection Act Of 1979, As Amended* states that the Federal Land Manager shall not make available to the public under subchapter II of chapter 5 of title 5 of the U.S. Code or any other provision of the law any information concerning the nature and location of any archaeological resource.

For this project the Area of Potential Effect was defined as the width of surface disturbance. Because the line would be installed in previously disturbed areas, no new surface disturbance would occur. A determination of *no historic properties in the Area of Potential Effect* for the project was submitted to the Nevada State Historic Preservation Office, according to 36 CFR 800.5, in a letter dated 23 December 1997. That office concurred with the determination in a letter dated 30 December 1997. The Air Force has completed its responsibilities for the undertaking.

No Action Alternative

Since there would be no action under this alternative, there would be no effect on any historic properties.

Alternative Data Transmittal Technologies

This alternative would have no effect on any historic properties because existing communication systems would be used and no new facilities would be constructed.

Alternative Route

Although this route was not surveyed for cultural resources, this use of this alternative would have the same effect as the proposed route since the alternative route for the FOL would be placed within existing rights-of-way which have already been disturbed.

4.11 Hazardous material/Hazardous waste

This proposed route would not generate hazardous waste as defined by 40 CFR 26 1. Hazardous materials would be limited to petroleum products for the vehicles and construction equipment.

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6.0 CONSULTATION AND COORDINATION

Biological issues related to sensitive species and the threatened desert tortoise were coordinated with the USFWS for the South Range portion of the proposed action. This Environmental Assessment has not been coordinated with any other federal or state and local agencies.

7.0 LIST OF PREPARERS

Gilbert F. Cochran, a Research Professor with the Desert Research Institute (DRI) has B.S. and M.S. degrees in Civil Engineering and a Ph.D. in Hydrology. He has 30 years experience in studies and management related to environmental concerns ranging from strictly hydrological investigations to preparation of major Environmental Impact Statements. Dr. Cochran was responsible for overall coordination of the EA effort, preparation of Chapters 1 and 2, and final editing and assembly of this EA. DRI is a Division of the University and Community College System of Nevada.

Richard H. French. A Research Professor with DRI has BS, MS and PhD degrees in Civil Engineering. He has 25 years experience in surface water and flood hydrology and is the author of several texts on those subjects, Dr. French was responsible for the climate, flood and surface water erosion aspects of the EA.

Stephen A. Mizell, an Associate Research Professor with DRI has a BS degree in Geology, MS degree in Hydrology/Hydrogeology and a PhD in Geoscience-Hydrology . He has 18 years of experience which encompass a variety of groundwater investigations including: flow system delineation, recharge estimation, groundwater and surface water chemistry/quality assessment, surface water/groundwater interaction, and hazardous waste and industrial site assessment. Dr. Mizell was responsible for the hydrologic and water resource aspects of this EA

Randy A. Nicholson, a Assistant Research Hydrogeologist with DRI's Water Resources Center, has a B.S. in Environmental Geoscience. He has over 15 years experience in exploration geology, mining operations and hydrogeology. Mr. Nicholson was responsible for the geological field survey and sediment sampling , and the geology and minerals resources materials and the document graphics and maps in this EA.

Lonnie C. Pippin, a Research Professor with DRI's Quaternary Sciences Center, has a Ph.D. in Anthropology and has over 24 years of archaeological and palynological experience in Nevada-California, the American Southwest and Peru. Since 1978 Dr. Pippin has been involved with archaeology studies on the Nevada Test Site and Nellis Air Force Range. Dr. Pippin was responsible for the cultural/historical survey and cultural/historical resources materials in this EA.

Bradley W. Schultz, a plant ecologist with DRI's Biological Sciences Center, has a M.S. degree in Rangeland Ecology and over 12 years experience in ecological and environmental studies in arid-zone ecosystems. Mr. Schultz was responsible for the sections covering biological, recreational, visual and wilderness resources.

Appendix A. List of Invertebrate SOC known to occur in Nevada.

Current Status	Scientific Name	Common Name	Former Status	Trend
INVERTEBRATES - SNAILS				
SOC	Fluminicola avernalis	Moapa pebblesnail	2	U
SOC	Fluminicola meriami	Pahranagat pebblesnail	2	U
SOC	Oreohelix nevadensis	Schell Creek Mountain snail	2	U
SOC	Pyrgulopsis cristalis	Crystal Spring springsnail	2	U
SOC	Pyrgulopsis erythropoma	Ash meadows pebblesnail	2	U
SOC	Pyrgulopsis fairbanksensis	Fairbanks springsnail	2	U
SOC	Pyrgulopsis isolatus	Elongate gland springsnail	2	U
SOC	Pyrgulopsis micrococcus	Oasis Valley springsnail	2	U
SOC	Pyrgulopsis nanus	Distal gland springsnail	2	U
SOC	Pyrgulopsis pisteri	Median gland springsnail	2	U
SOC	Tyronia angulata	Sportinggoods snail	2	U
SOC	Tyronia clathrata	Grated tryonia (White River Snail)	2	U
SOC	Tyronia elata	Point of Rocks snail	2	U
SOC	Tyronia ericae	Minute Tyronia (snail)	2	U
SOC	Tyronia variegata	Amargosa tryonia (snail)	2	U
INVERTEBRATES - CLAMS AND MUSSELS				
SOC	Anodonta californiensis	California Floater	2	D
INVERTEBRATES - INSECTS				
SOC	Capnia lacustra	Lake Tahoe benthic stonefly	2	U
SOC	Psychomastix deserticola	Desert monkey flower	2	U
SOC	Pelocoris shoshone	Amargosa naucorid (bug)	2	U
SOC	Aegialia crescenta	Crescent Dune aegialian scarab beetle	2	U
SOC	Aegialia hardyi	Hardy's aegialian scarab beetle	2	U
SOC	Aegialia magnifica	Large aegialian scarab beetle	2	U
SOC	Agabus rumppi	Death Valley agabus diving beetle	2	U
SOC	Aphodius sp	Crescent Dune aphodius scarab beetle	2	U
SOC	Aphodius sp	big Dune aphodius scarab beetle	2	U
SOC	Aphodius sp	Sand Mountain aphodius scarab beetle	2	U
SOC	Miloderes rulieni	Rulien's milderes weevil	2	U
SOC	Pseudocotalpa giulianii	Giuliani's dune scarab beetle	2	U
SOC	Serica sp.	Sand Mountain serican scarab beetle	2	U
SOC	Serica sp.	Crescent Dune serican scarab beetle	2	U
SOC	Stenelmis calida calida	Devil's Hole warm spring riffle beetle	2	S
SOC	Stenelmis calida moapa	Moapa warm springs riffle beetle	2	U
SOC	Cercyonis pegala ssp.	Carson Valley wood nymph (butterfly)	2	U

Appendix A (cont.). List of Invertebrate SOC known to occur in Nevada.

Current Status	Scientific Name	Common Name	Former Status	Trend
SOC	Cercyonis pegala ssp.	White River wood nymph (butterfly)	2	U
SOC	Chlosyne acastus	Spring Mountains acastus checkerspot (butterfly)	2	U
SOC	Euphilotes battoides ssp	Baking Powder Flat blue (butterfly)	2	U
SOC	Euphilotes enoptes ssp	Dark blue (butterfly)	2	U
SOC	Euphilotes rita ssp.	Sand Mountain blue (butterfly)	2	U
SOC	Euphilotes rita mattoni	Mattoni's blue (butterfly)	2	U
SOC	Euphydryas anicia morandi	Morand's checkerspot (butterfly)	2	U
SOC	Euphydryasmonoensis	Mono checkerspot (butterfly)	2	U
SOC	Hesperia comma ssp.	Spring Mountain comma skipper	2	U
SOC	Hesperia comma mirimae ssp	White Mountain skipper	2	U
SOC	Hesperia comma uncas ssp	Railroad Valley skipper	2	U
SOC	Hesperopsis gracielae	MacNeil sooty wing skipper	2	D
SOC	Limenitus archippus lahontani	Nevada viceroy	2	D
SOC	Limenitus weidemeyerii nevadae	Nevada admiral (butterfly)	2	U
SOC	Phyciodes pascoensis ssp	Steptoe Valley crescentspot (butterfly)	2	U
SOC	Plejebus icarioides ssp	White Mountains icarioides blue (butterfly)	2	U
SOC	Plejebusicarioides ssp	Spring Mountains icarioides blue (butterfly)	2	U
SOC	Plejebus saepiolus	White Mountains saepiolus blue (butterfly)	2	U
SOC	Plejabusshasta charlestonensis	Spring Mountain blue (butterfly)	2	D
SOC	Polites sabuleti albomontana	White Mountains Sandhill skipper	2	U
SOC	Polites sabuleti sinemaculata	Denio Sandhill skipper	2	U
SOC	Pseudocopaeoces eunus eunus	Alkali skipper	2	U
SOC	Speyeria atlantis greyi	Grey's silverspot (butterfly)	2	U
SOC	Speyeria nokomis ssp.	Carson Valley silverspot (butterfly)	2	D
SOC	Spereria zerene carolae	Carole's silverspot (butterfly)	2	U
SOC	Eucerceris ruficeps	Redheaded sphecid wasp	2	U

1 Former status refers to classification categories used by USFWS prior to 1996.

2 Population trend listed in 1994 Federal Register Notice: I = improving; D = declining; S = stable; and U = Unknown